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COMMERCIAL FISHERIES REVIEW



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DEPARTMENT OF THE INTERIOR
J.A. KRUG, SecretaryFISH AND WILDLIFE SERVICE
ALBERT M. DAY, Director**COMMERCIAL FISHERIES REVIEW**A REVIEW OF DEVELOPMENTS AND NEWS OF THE FISHERY INDUSTRIES
PREPARED IN THE BRANCH OF COMMERCIAL FISHERIES

A. W. Anderson, Editor

R. T. Whiteleather, Associate Editor

Wm. H. Dumont and J. Pileggi, Assistant Editors

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LEFT ASTORIA, OREGON, ON JULY 21, 1947, TO FISH
FOR KING CRABS IN BERING SEA.

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EXPERIMENTAL FISHING TRIP TO BERING SEA

By Joseph E. King*

INTRODUCTION

The motor vessel Alaska, property of the Reconstruction Finance Corporation and operated by the Pacific Exploration Company, left Astoria, Oregon, on July 21, 1947, to fish for king crabs in Bering Sea. Aboard were 13 men: the master of the vessel, a chief engineer, an assistant engineer, a cook, six fishermen, a representative of the International Fisheries Commission, a cannery technician from a commercial West Coast packer, and the author who served as observer for the Fish and Wildlife Service.

The objectives of the trip were several. The crew's chief aim, of course, was to make a profitable trip in as short a time as possible and return to the home port. The International Fisheries Commission desired to learn more of the size, movements, distribution, and abundance of halibut in Bering Sea and had an agreement with the Pacific Exploration Company whereby all live halibut taken incidental to crab fishing operations were to be tagged and released by a representative of the Commission. The Fish and Wildlife Service hoped to supplement the information gained earlier by the studies¹ of the Alaska Crab Investigation pertaining to the size, distribution, and abundance of the king crab and bottom fish in Bering Sea. All the above groups were interested in determining whether or not a vessel of the type and size of the Alaska could operate satisfactorily and with profit in Bering Sea.



THE ALASKA TIED UP AT THE DOCK AT FALSE PASS, ALASKA

A condensed log of the trip follows:

Left Astoria, July 21; arrived south side of Alaska Peninsula, July 27; made three test drags, then proceeded through Unimak Pass to Bering Sea; en-

*Aquatic Biologist, Branch of Fishery Biology, Fish and Wildlife Service.

¹"The Alaskan King Crab," Fishery Market News, May 1942 - Supplement, Vol. 4, No. 5a, U. S. Fish and Wildlife Service.

Note: Detailed tables giving data recorded for each drag made in Bering Sea and south of the Alaska Peninsula; catch for each drag in actual numbers of crab and halibut and estimated pounds of cod, pollock, and flounders; weight distribution of male and size distribution of male and female crabs, halibut, cod, pollock, yellowfin sole, flathead sole, rock sole, lemon sole, and herring; air, water surface and bottom temperatures in degrees Centigrade taken in the fishing grounds; and list of fishes collected or observed in the Bering Sea trip will appear as an appendix to this article when it is published as Fishery Leaflet 330.

gaged in trawling in Bering Sea from August 1 to September 5; made twelve additional drags on the south side of the Aleutian Peninsula; vessel then departed for Astoria, arriving September 16.

THE VESSEL

DESCRIPTION:

General type of vessel	trawler
Over-all length	100 feet
Beam	25 feet
Draft	13½ feet
Main engine	supercharged diesel, delivering 600 hp. at 400 RPM
Auxiliary engines	2 diesels, 75 hp., each with power take-off for driving trawling winch, and each driving a 220 v. generator
Trawling winch	having two main spools each with a capacity of 500 fathoms of 5/8-inch cable (on this trip the vessel car- ried 450 fathoms on each spool)
Fuel capacity	17,700 gallons
Lubricating oil capacity	1,200 gallons
Fresh water capacity	2,240 gallons

As crab legs are very light and bulky, the vessel was never carrying sufficient weight to be properly trimmed. In all other respects, the Alaska was quite seaworthy and performed very well in heavy seas whether going into the wind or before the wind.

MISCELLANEOUS EQUIPMENT ABOARD THE VESSEL:

- 1 - Radio-telephone, 65 watt
- 1 - Radio-direction finder
- 1 - Sonic depth finder, non-recording type

A 125- or 150-watt radio-telephone would have been much more satisfactory than the 65-watt set. On many occasions, perhaps due to atmospheric conditions, the operator could not contact shore stations or other vessels within 150-200 miles.

The radio-direction finder was of little value when fishing in the eastern Bering Sea area, as the Alaska was beyond the accurate range of the beacons which serve that region. Within 100 miles of the beacons, however, it was very useful.

The fishing would have been greatly handicapped without a sonic depth finder. The one aboard the vessel operated very well in good weather but did not function properly when the vessel was heaving and pounding in rough seas. Rolling did not throw the instrument off as much as pitching.

DESCRIPTION OF TRAWLS USED:

Type of trawl	Eastern or North Atlantic
Number of new trawls at start of trip	6

Number of unused trawls at finish	2
Trawls completely torn up	1
Trawls in fair shape at finish	3
Foot rope	118 feet in length, 5/8-inch cable
Head rope	95 feet in length, 3/8-inch cable
Splitting strap	1/2-inch cable
Dandylines	17 fathoms in length, 1/2-inch cable
Buoyancy floats	steel, 7 inches, 19 to 20 in number
Bag rings	3 inches, galvanized
Twine in body of net	No. 60 medium lay cotton
Cod end	9 thread sisal, held together with hog rings
Mesh sizes (stretched mesh):	
Wings, square and belly of net	6 inches
Intermediate bag	4 1/2 "
Cod end of net	5 "
Trawl doors	about 700 pounds each, 4 x 7 1/2 feet

The trawls used functioned quite satisfactorily when towed at the proper speed and under normal weather conditions. When the sea became exceptionally rough, the catch would drop off. It was assumed that the net was not hugging the bottom and fishing properly.

The normal towing speed was 2 to 3 knots with the main engine at 200 to 220 RPM. If the rate were increased to 260 RPM, the net would not remain on the bottom.

THE REFRIGERATION SYSTEM:

- 2 compressors, 2-cylinder, vertical type, size 5" x 5". Driven by 2 motors, 20 hp., 220 v., 60 cy., 3 phase.
- 1 pump, cooling with ammonia.
- 2 pumps, vertical centrifugal, for brine agitation.
- 2 tanks, for sharp freezing, each of approximately 1,100 cubic feet of space and located about midway on port and starboard sides of the vessel. Each tank containing 582 feet of 1 1/4" ammonia refrigeration coils on walls, and 2,660 feet of 1 1/4" shelf coils.
- 1 hold, main or forward, containing approximately 14,735 cubic feet of space and 2,212 feet of 1 1/4" ammonia refrigeration coils.
- 1 hold, aft, of approximately 12,500 cubic feet of space and containing 1,892 feet of 1 1/4" ammonia refrigeration coils.

CRAB COOKING EQUIPMENT:

- 1 Steam generator, approximately 3-4 hp. capacity.
- 1 Cooking tank of 3/8" steel insulated with 1 1/2" wood planking.
Cover in four sections of 1 1/2" plank. Inside dimensions of tank--94" long x 35 1/2" wide x 38" deep. Bottom of tank contains about 63 feet of 1 1/4" steam piping.

AREAS FISHED AND GENERAL RESULTS

Most of the fishing of the Alaska was performed in an area about 50 miles in length (SW-NE) lying 30 to 60 miles offshore between Port Moller and Black Hills, in the outer portion of Bristol Bay. This was one of the areas explored by the Alaska Crab Investigation in 1941. Upon leaving Bering Sea after 36 days of fishing, the vessel had a total catch of 14,172 crabs (approximately 50,000 pounds of crab legs), for an average of 107 crabs per drag. The bulk of the catch came from the general area indicated above and shown in Figure 1. The prospecting done in

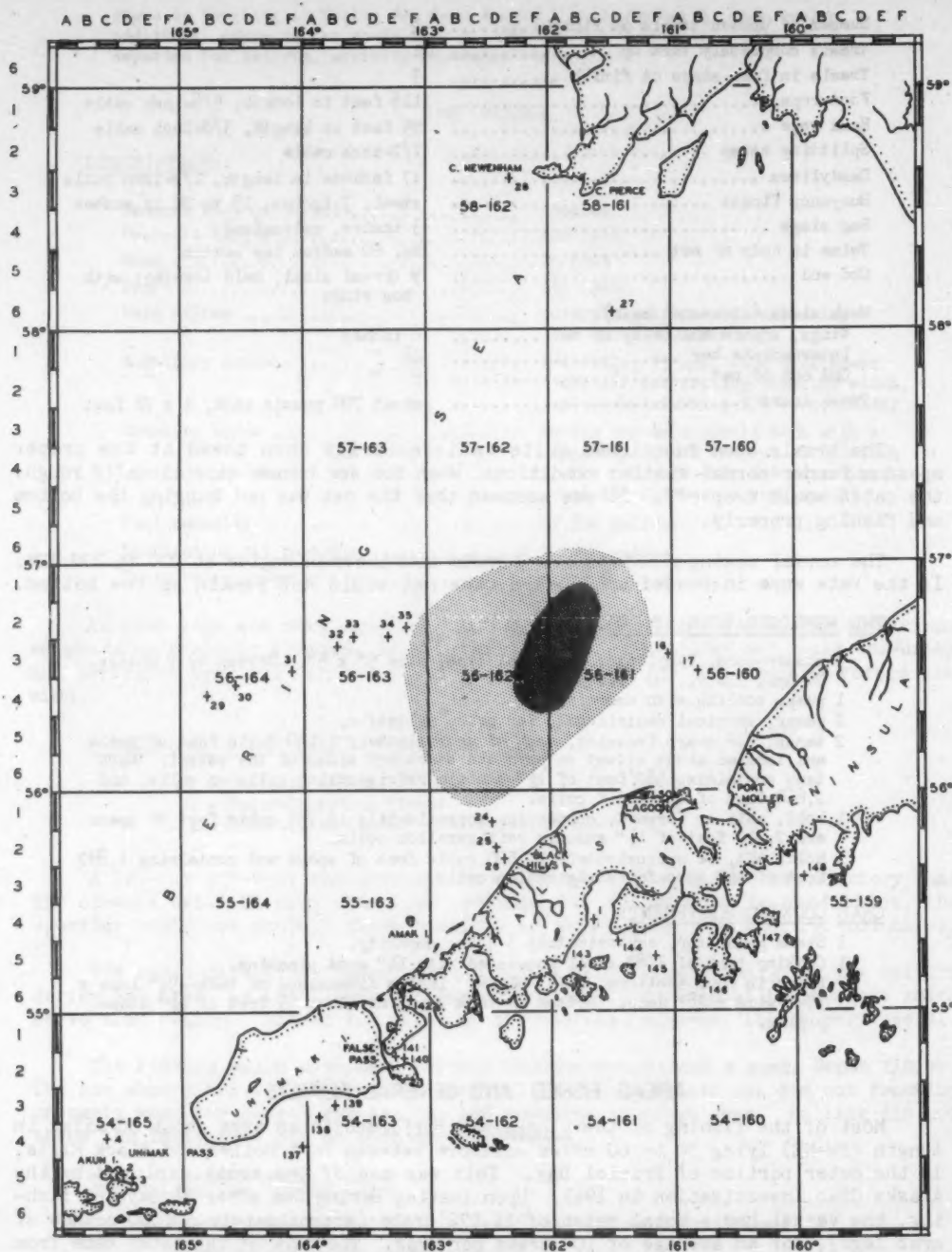


FIGURE 1 - FISHING OF THE ALASKA WAS PERFORMED IN AN AREA ABOUT 50 MILES IN LENGTH (SW-NE) LYING 30 TO 60 MILES OFFSHORE BETWEEN PORT MOLLER AND BLACK HILLS, IN THE OUTER PORTION OF BRISTOL BAY.

Bering Sea outside this area and on the south side of the Peninsula accounted for a very small percent of the catch and was quite unprofitable fishing. Table 1 presents the catch of crabs and major fish. While the numbers given for crabs

Table 1 - Catch of Crabs, Halibut, Cod, Pollock, and Flounders

Area	C r a b s				Cod	Pollock	Halibut		Other Flounders
	Males	Females	Total	Average per hrs. fishing			Med. 1/	Small 2/	
	No.	No.	No.		Lbs.	Lbs.	No.	No.	Lbs.
Bering Sea	13,332	840	14,172	52.9	42,800	37,925	98	336	98,285
South Side of Peninsula	37	7	44	2.4	2,560	135	46	271	6,925
Total	13,369	847	14,216	47.7	45,360	38,060	144	607	105,210

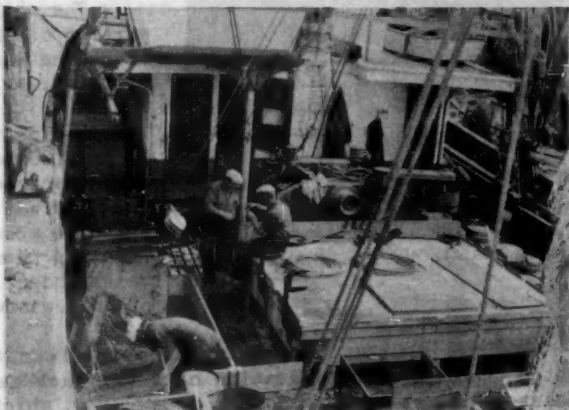
1/Fish 10 pounds and over (heads off).

2/Fish under 10 pounds, including legal-sized chickens (5 to 10 pounds) and babies less than legal size (under 5 pounds).

and halibut are actual counts, the poundages for the balance of the catch are estimates based on the consensus of opinion of several members of the crew.

The entire catch was taken by trawling. No tangle nets or other types of gear were used.

The apparent scarcity of halibut in Bering Sea was disappointing, both to members of the crew and to the International Fisheries Commission, but the vessel may not have been operating on the most abundant grounds. As indicated by the length frequency distributions of the 434 halibut taken in Bering Sea and the 317 from the south side of the Peninsula, the average lengths of these fish are considerably less than those normally taken by the commercial fishery. As most of these fish were alive when brought aboard, those over 65 cm. total length were tagged and released while the smaller fish were measured and released without tagging. Not more than a dozen halibut classed as medium-size by market standards were frozen during the entire trip. The catch of baby halibut (under 5 pounds) was a very significant part of the catch. According to the International Fisheries Commission, of the 317 fish taken on the south side of the Peninsula, 72 percent by number were under 5 pounds, and that of 434 halibut taken in the Bering Sea proper, 44 percent were under 5 pounds.

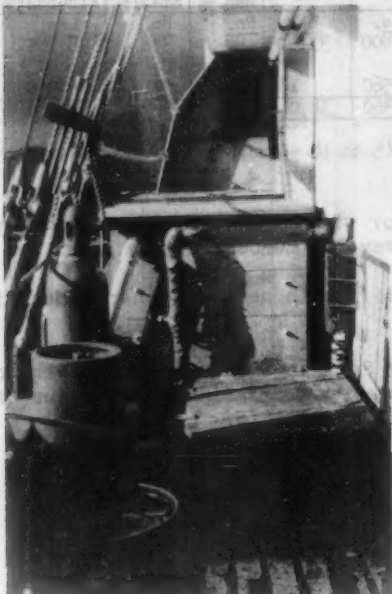


LOOKING FORWARD ON THE ALASKA; BUTCHERING TABLE IN THE FOREGROUND BEARING TWO BUTCHERING KNIVES, TRAWLING WINCH LOCATED JUST BEYOND; IN THE PORT-SIDE WALKWAY THE OPENING TO THE SHARP FREEZER CHAMBER, THE COOKING TANK, AND THE COMPARTMENT HOUSING THE STEAM GENERATOR.

The other species of bottom fish taken in Bering Sea were mainly the yellow-fin sole (*Limanda aspera*), cod (*Gadus macrocephalus*), Alaska pollock (*Theragra chalcogramma*), and rock sole (*Lepidopsetta bilineata*). The flathead sole (*Hippoglossoides elassodon*), arrow-toothed flounder (*Atheresthes stomias*), and lemon

sole (*Pleuronectes quadrituberculatus*) were taken in lesser abundance. During the limited work south of the Alaska Peninsula, a higher proportion of flathead, lemon, and sand sole, and a lower proportion of the yellowfin sole, cod, and pollock were found.

Most of the yellowfin sole taken in Bering Sea and south of the Peninsula were thin-bodied fish and below the size desired for filleting by the present



NEARER VIEW OF PORT-SIDE ARRANGEMENT SHOWING ENTRANCE TO SHARP FREEZE CHAMBER, COOKING TANK, AND STEAM GENERATOR COMPARTMENT ON ALASKA.

market at Seattle. The flathead sole taken in Bering Sea were also small and comprised a smaller portion of the catch than south of the Peninsula. In the latter area, many of the flathead sole were of marketable size, and in some locations, appeared to be the most abundant flat fish. The lemon sole taken were a thick-bodied fish but did not constitute a substantial portion of the catch in either locality. Flounders (*Platichthys stellatus*) were taken south of the Peninsula but none were encountered in the area of operations in Bering Sea. The majority of the rock sole taken in Bering Sea were small in size. This species constituted only a minor portion of the catch in the few drags made on the south side.

The pollock accounted for a substantial portion of the catches in the deeper waters of Bering Sea and may have commercial possibilities.

During the course of the trip, between 90 and 100 tons of cod, pollock, and flounders were discarded. The demand for these fish at the time was such that it did not pay the fishermen to spend valuable time in dressing and freezing them. A great amount of work had to be expended, however, in clearing the decks of this waste.

It has been suggested that in operations where the chief objective is to catch crabs, some modification of gear, such as cutting back the head rope and enlarging the mesh size, might be employed, which would increase the escapement of these presently undesired fish. It is quite possible, however, that at some future time, the economic factors of supply, demand, and cost of production, which greatly influence the development of a fishery, may be changed so as to encourage the utilization of these fish.

It is recognized that the statements above pertaining to the relative size and abundance of crabs and fish are based largely upon observations made in a limited period of time and area. They represent conditions, however, as found in that portion of the Bering Sea at that time of year. As the major fishing effort of the Alaska was concentrated in a relatively small area lying off the Black Hills and chiefly at depths from 30 to 50 fathoms, it was certainly possible that large concentrations of both crabs and fish may have been missed. In view of the fact that the Alaska was being operated on a test commercial basis, it was not feasible to spend considerable time in pure exploration. Therefore, after a few exploratory

drags, the remainder of the time was spent on the grounds which were found to provide the most profitable fishing. This particular area was described in the Service's report, "The Alaskan King Crab," as being one of the richest grounds located during that investigation. This agreed also with the experiences of the other crab fishing enterprises which were conducted in Bering Sea in the summers of 1946 and 1947. Also, the Alaska and the other vessels were operating in the area at the time of year recommended by the Alaska Crab Investigation, and all have reported generally similar experiences.

MISCELLANEOUS BIOLOGICAL OBSERVATIONS

THE KING CRAB: Very young king crabs were taken in only one drag. This was made close to the beach in 18-21 fathoms and netted 5,000 to 10,000 young of 2.5 to 3.5 cm. in carapace width. The width and length measurements were nearly identical in most of those measured. The sexes were apparently of equal numbers and similar in size.

In another drag made offshore in Bering Sea, at a depth of 37 to 47 fathoms, the catch included 40 large male crabs and about 100 small males and females of 2½ to 3 inches carapace width. None of the small females were carrying eggs. Crabs of this size were not encountered in the deeper offshore waters. In four other drags, at depths from 26 to 37 fathoms, the sex ratio was about equal and, in many cases, the females were in the majority. At depths from 38 to 40 fathoms, the catch was nearly all males, a desirable feature from a commercial viewpoint.

All females of adult size taken during the expedition were carrying eggs. No individuals of either sex were observed in a stage indicating a recent molt or an approaching molt.

The females were one-third to one-half smaller in weight and size than the males. The crabs taken south of the Peninsula were definitely larger than those from Bering Sea.

A great number of crab stomachs were examined and found to be either empty or containing a small amount of material difficult for analysis. The animal's mandibles and gastric mill are exceedingly efficient. The most frequently identified objects among the stomach contents were fragments of brittle stars, and small clam shells, scale worms, pieces of sponge, and body parts of other small crabs.

According to the work of Marukawa,^{2/} three species of king crabs occur in the cold waters of the northern Pacific, Paralithodes camtschatica, P. platypus and P. brevipes. Only P. camtschatica was included in the catches of the Alaska, as far as could be determined.

^{2/}Marukawa, Hesatoshi. 1933. Biology and fishery research on Japanese King Crab, Paralithodes camtschatica (Tilesius). Jour. Imperial Fisheries Experimental Station, No. 3, March. Tokyo.



A CREW MEMBER HOLDING A SPECIMEN OF A KING CRAB.

FEEDING HABITS OF SOME OF THE COMMON FISH

No attempt was made to analyze stomach contents on a quantitative basis but whenever time was available, fish of different species were examined. For example: rock sole—found to contain sea cucumbers, echiuroid worms, and scale worms; yellowfin sole—contained small clams and amphipods; cod—an omnivorous fish, contained remains of such other fish as flounders, sea poachers, herring, pollock, etc., also crabs, shrimp, and tunicates; pollock—those examined contained mostly shrimp and a few small fish.

CRAB BUTCHERING AND PROCESSING

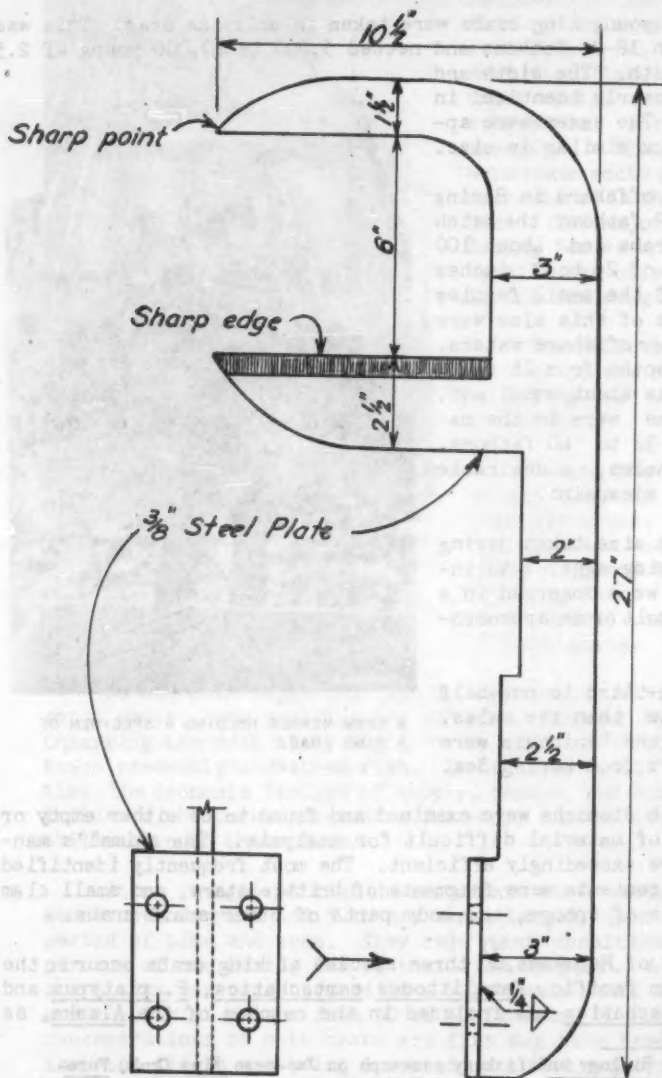


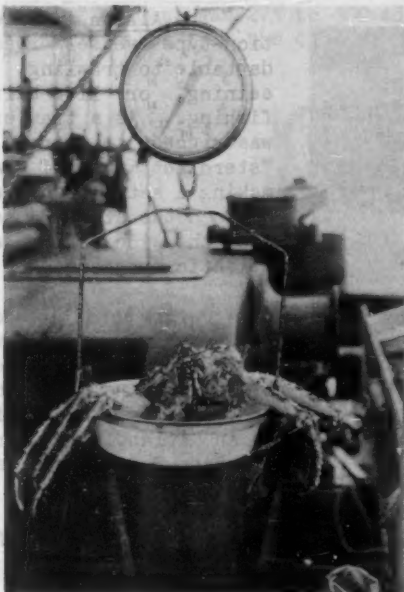
FIGURE 2 - DRAWING OF THE TOOL OR KNIFE USED IN BUTCHERING THE CRABS.

When the contents of the bag were dumped on deck at the end of each drag, the crabs were picked out and thrown onto the butchering table which was actually the raised hatch cover of the main hold. The carapace was removed by hand with the assistance of the butchering tool shown in Figure 2. The ventral part of the body was broken in the mid-line over the sharp edge of this tool and the remaining gills and other undesirable material were cleaned from the bases of the legs. The legs were then washed and stacked in wire baskets until enough were collected for a cook (about 200, depending on size). The average rate of butchering was about 53 crabs per man per hour.

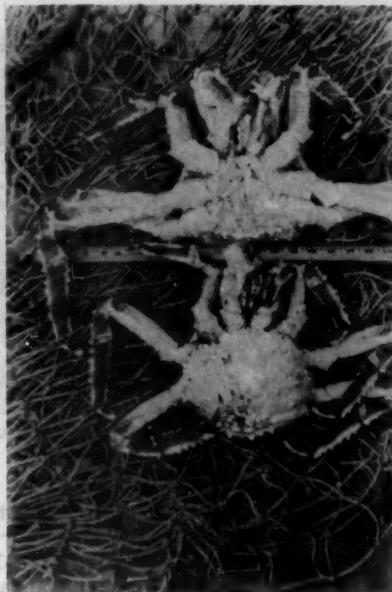
The crabs were cooked in boiling sea water for 17 minutes, quickly cooled by running sea water through the tank for 20 minutes, then removed by hand and replaced in wire-mesh baskets ($31\frac{1}{2}$ " x $17\frac{1}{2}$ " x 4"). The capacity of each sharp freezer was about 60 baskets holding the legs of 600 crabs. About one-half hour was required to

load each freezer. The temperature of the freezer varied from -12° F. to -4° F. and the crabs were usually left in the freezer about 12 hours.

At the end of this time, the baskets were passed into the forward cold storage room where the crab legs were glazed by dipping the baskets twice in fresh water. The legs were then stowed in side bins and at intervals during the trip were sprinkled



AN ABOVE-AVERAGE SIZE MALE KING CRAB.



MALE KING CRAB ABOVE WITH TRIANGULAR-SHAPED ABDOMEN; FEMALE BELOW WITH BROAD FAN-SHAPED ABDOMEN.

with water to maintain a heavy glaze. The temperature of the cold storage holds remained at 10° F. to 12° F. At the end of the trip, the catch appeared to be in excellent condition.

On August 8, for experimental purposes, 28 crabs were weighed, cooked in the whole state, weighed again, butchered, and then the legs weighed. The live weight was 305.55 pounds, the final butchered weight 150.25 pounds, thus indicating a 51 percent loss in weight resulting from the cooking and butchering processes.

OPERATING PROCEDURE OF CRAB COOKING EQUIPMENT

Steam was generated in boiler until 75 pounds of pressure was reached, which required about 10 minutes. Steam was then turned into pipes in the cooking tank, at which time pressure immediately dropped to 25 pounds where it remained during the cooking process. About 2 to 2½ hours were required to heat the water to boiling. The tank was usually about two-thirds full of boiling water when the crabs were introduced. Capacity of tank was about 200 crabs, depending on their size.

The water would not stay in the tank in rough weather even with the tank cover in place. On a few occasions, the person loading the tank with crabs received minor

burns from boiling water splashing out of the tank. At times, it was necessary to heat two or more tankfuls of water in order to have enough remaining to cook the crabs. The cooking procedure might have been rendered less hazardous by the use of a closed retort rather than an open tank.

SUITABILITY OF VESSEL FOR FISHING OPERATION



TRAWL DOOR BEING FASTENED IN PLACE AT END OF DRAG ABOARD ALASKA.

same locality. On several occasions when the Alaska was at anchor because of bad weather, the Deep Sea was fishing nearby and being, mainly, that on the latter vessel, the men handled the gear amidship, protected from following seas by the wheel house astern; also with the "side set" type of operation the entire net is not hauled aboard after each drag and, what is probably more important, the bag does not swing pendulum-like from a high boom when it is being lifted aboard. Some of the men barely escaped injury on several occasions when trying to get the bag aboard and dumped during rough weather. With no protection astern, high seas sometimes came aboard adding to the difficulties.

During the first week in September, weather conditions became such that even the Deep Sea had to stop fishing. When weather permitted, however, the Alaska, with her type of gear, seemed to take just as many crabs per drag as the other vessel.

There is considerable question as to whether or not vessels of this size, 100 feet and 130 feet, can profitably engage in the Bering Seaking crab fishery as a year-around enterprise. It is generally conceded that after October 1, weather conditions in Bering

The Alaska is a combination-type vessel readily adaptable to trawling, purse-seining, or live-bait tuna fishing. As a trawler, she was rigged to operate with a "stern set" type of gear. In making a set, the net was put out over the stern rather than from the side as in the North Atlantic draggers.

During conditions of very bad weather, such as was experienced in the latter part of August, the vessel did not prove nearly as satisfactory as an Atlantic-type dragger, the Deep Sea, which was also fishing for king crabs in the



THE ENTIRE NET WAS TAKEN ON BOARD AT THE END OF EACH DRAG AND LAID-OUT ON THE STERN IN PREPARATION FOR THE NEXT DRAG.

Sea are such that if fishing is attempted, much time will be wasted regardless of type of gear, and that in the event of a severe storm there is no adequate shelter.

HAZARDS TO FISHING ENCOUNTERED IN BERING SEA

NEED FOR NAVIGATIONAL AIDS: The most profitable fishing area, as found in the month of August, was 275 to 300 miles from the St. Paul marine radio beacon and about 175 miles from the Cape Sarichef station. As the accurate range of



THE TIE-ROPE IS JERKED AND THE BAG EMP-TIED. SHOWING THE TYPICAL CATCH OF COD, POLLOCK, AND A FEW CRABS.

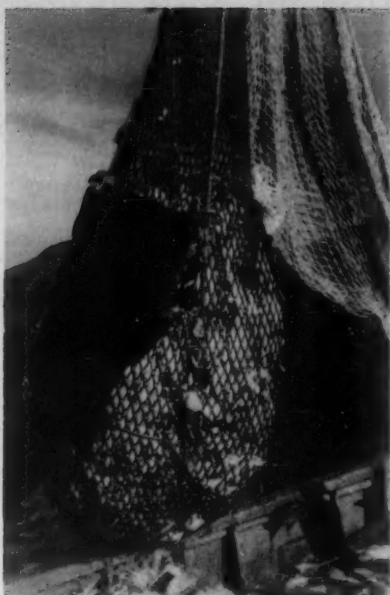


HOLDING THE NET CLEAR AS THE BAG IS DUMPED.

these stations is only 100 miles, they were of little value in determining the vessel's position. If a more active fishery should develop with more vessels using these waters, there would be a definite need for radio beacons nearer the fishing grounds.

Because of the almost continual fog in late summer, land is seldom sighted. Also, the drift due to strong tidal currents is considerable. As a result of these factors, vessels must depend upon sonic devices, loran, or radio fixes in addition to dead reckoning.

LACK OF PORT FACILITIES: The only port on the Bering Sea side of the Peninsula within a reasonable running distance of the fishing grounds tested is Port Moller. This port is reached through a shallow channel which, at present, is buoyed only by the local fishermen each season. The captain states that it is hazardous for a boat to be at the cannery dock when a strong southwest or southeast wind is blowing. Although adequate for the existing salmon fishery, if a substantial offshore fishery



HOISTING THE BAG ABOARD. COWHIDE CHAFING GEAR WAS USED TO PROTECT THE BAG FROM ABRASION.

ust and the first week in September, there were several strong blows reaching gale proportions. Hail and snow fell a few times and it appeared that winter had arrived. The more severe storms were accompanied by winds from the southwest or northwest. On August 31, during a heavy southwester, the anchor line parted resulting in the loss of the vessel's only sea anchor.

While in Bering Sea and the North Pacific, air temperatures were recorded three times daily: in the early morning, noon, and late afternoon. In Bering Sea, during the period August 1 to September 5, the minimum recorded was 43° F., the maximum 64° F., with the average for the period being 51° F.

should develop in the area, additional docking space and facilities would be necessary.

IMPEDIMENTS TO TRAWLING: The area tested has, in general, a very good bottom for trawling. The bottom material is of grey volcanic sand or ash, with occasional patches of mud. On four of the drags, snags were encountered, probably rocks, which resulted in bad tears in the net and loss of at least part of the catch. In two other drags, tons of a peat-like material were picked up in such mass that the net could not be lifted aboard the vessel. On 16 drags, dense colonies of a stalked ascidian were encountered which, in some instances, completely clogged the net and greatly interfered with its effectiveness. During two other drags, several thousand pounds of sponges having a very foul odor were picked up and it was quite a chore to dispose of them.

OTHER OBSERVATIONS ON WEATHER CONDITIONS: During the first two weeks of August, fine fishing weather was experienced in Bering Sea. There was some fog every day, and light rain on frequent occasions, but the sea was relatively calm. In the latter part of Aug-



CRAB BUTCHERING IN PROGRESS AT RIGHT. THE MEN ON THE LEFT ARE CLEANING GILLS AND OTHER ORGANS FROM THE BASES OF THE LEGS. IN THE BACKGROUND, MAN IS PICKING CRAB MEAT.

IN SUMMARY:

Period spent in Bering Sea
Total number of days

-- August 1 - September 5

-- 36

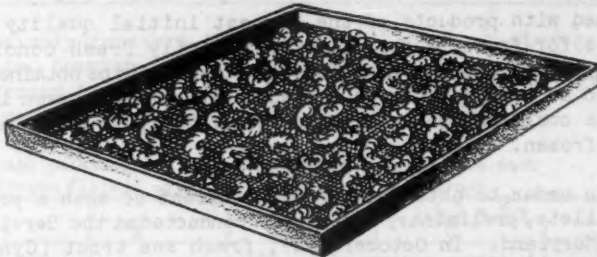
Days on which sun shone at least part of time -- 10
Days on which rain fell -- 20
Number of days spent in port -- 4½
Fishing time lost due to bad weather--hours -- 105

BOTTOM TEMPERATURES: At intervals, when conditions permitted, the temperature of the water near the bottom was obtained by means of a reversing thermometer. In general, the lowest temperatures were found in the deepest waters, which was to be expected. On the best crab fishing area, the bottom temperatures ranged from 3° C. to 4° C. The best drag, yielding 502 crabs, was made in water of 41-45 fathoms with a bottom temperature of 3.01° C. Crabs were taken from waters with bottom temperatures ranging from 1.65° C. to 7.25° C. Air and water surface temperatures were taken at each station where the bottom temperature was obtained.



SMOKING SHRIMP

Smoked shrimp are cooked shrimp which are smoked for additional color and flavor. Shrimp smoked in the shells retain their flavor and texture, and remain moist—a desirable condition. When lightly smoked, the shells should have a light reddish-brown color and the meats should be sweet with a faint trace of smoke flavor. To satisfy some preferences, however, shrimp may be given longer processing to impart a heavy smoke flavor and dark color.



Drying of the shrimp on the trays should be rapid, if necessary using an air-draft created by placing fans in front of the trays.

The yield should approximate about 60 percent; that is, 100 pounds of headed green shrimp should yield about 60 pounds of cooked smoked shrimp.

Shrimp may be smoked after the shells are removed, but the finished product is usually dry-textured and bitter, and the yield is smaller.

Smoked shrimp can be stored satisfactorily at temperatures under 40° F. for 2 to 3 weeks, depending upon the degree to which the shrimp were smoked. Smoked shrimp are perishable and should be refrigerated at all times.

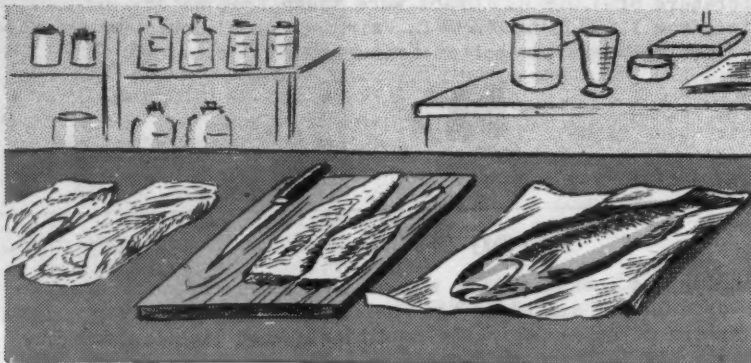
--Fishery Leaflet 312

EFFECT OF REFREEZING ON QUALITY OF SEA TROUT FILLETS

By S. R. Pottinger,* Rose G. Kerr,** and W. B. Lanham, Jr.***

In certain fisheries, fishing craft may be absent from port for 6 to 10 days or sometimes longer. Fish caught during the first part of the trip may be a week or more out of water by the time the boats return to port. Since the catch is held at the temperature of melting ice during this period, the fish will not be

of the best possible quality when landed, nor will the fillets that are prepared from them be of the highest attainable quality.



Many of these fillets are frozen and held in storage for relatively long periods. Since best results in frozen storage are

obtained with products of the highest initial quality, the need for preparing fillets for freezing from fish in strictly fresh condition is apparent. Presumably prime quality fish for filleting could be obtained if the catch were frozen as soon as caught and kept frozen until landed or even longer. In shore stations, fillets could then be cut from the partially or completely thawed fish, packaged, and refrozen.

In order to obtain data on the effect of such a procedure on the quality of the fillets, preliminary tests were conducted at the Service's laboratory in College Park, Maryland. In October 1947, fresh sea trout (*Cynoscion regalis*) weighing from 1 to 1½ pounds were obtained from a packer in the Chesapeake Bay area. These fish had been taken from traps just before noon and were brought in crushed ice to the laboratory in the early part of the afternoon of the same day. They were in rigor at the time of arrival at the laboratory.

The fish were then divided into lots as follows:

1. One lot was immediately frozen in the round;
2. Another lot was filleted immediately and the fillets packaged and frozen;
3. A third lot was held in the round in crushed ice for four days, then filleted and the fillets packaged and frozen.
4. Also, after four days, the round fish which had been held frozen were further divided into two lots, one being allowed to thaw partially and the other to thaw completely, and fillets were then cut from each of these lots, packaged, and frozen.

*Chemist, Fishery Technological Laboratory, Branch of Commercial Fisheries, College Park, Md.

**Home Economist, Fishery Technological Laboratory, Branch of Commercial Fisheries, College Park, Md.

***Chemist, formerly with Fishery Technological Laboratory, Branch of Commercial Fisheries, College Park, Md.

Four groups of frozen fillets which had been treated in different ways were thus obtained:

- A. Fillets cut from fish within a few hours after being taken from the water.
- B. Fillets cut from fish held in the round in crushed ice for four days.
- C. Fillets refrozen after being cut from fish frozen in the round within a few hours after being taken from the water, held frozen for four days, and then partially thawed.
- D. Same as C, except the frozen fish were completely thawed.

The fillets were packaged by wrapping pairs of fillets tightly in moisture-vaporproof cellophane before being frozen. All freezing was done at -20° F. and the fillets were stored at 0° F. Periodically, three packages of fillets from each group were removed from storage for organoleptic examination and determination of the quantity of "drip" which occurred upon thawing. The results of the "drip" determinations and palatability scores are shown in Tables 1 and 2. The quantity

Table 1.--Average amount of "drip" in percent by weight for three samples from each group of frozen fillets after varying periods of storage.

Months in Storage	Groups of Fillets			
	A	B	C	D
$\frac{1}{2}$	1.3	1.2	2.1	1.9
4	1.0	1.4	2.9	2.4
6	1.6	1.6	3.0	2.6
8	1.3	1.5	2.9	2.8
10	1.4	1.5	2.9	2.7

of "drip" remained relatively constant throughout the 10-month storage period. It is of interest to note, however, that the amount of "drip" obtained from refrozen fillets cut from fish frozen in the round was about twice that for fillets frozen only once, although in no instance were the values unduly high.

Table 2.--Average palatability scores for three samples from each group of frozen fillets after varying periods of storage.

Months in Storage	Groups of Fillets			
	A	B	C	D
$\frac{1}{2}$	98.6	(100 equals maximum score) 96.3	99.2	97.7
4	96.1	93.4	92.6	93.8
6	94.9	94.9	93.6	93.6
8	88.4	86.7	86.9	88.3
10	82.7	83.6	80.9	84.6

No appreciable differences in palatability scores are apparent between groups. At the eighth-month period, however, the quality of the samples in all the groups became less desirable, particularly in relation to flavor of the cooked product. This was especially true after 10 months, at which time the tests were terminated.

It was found that in filleting fish in a partially thawed condition, the filleting operation was slowed considerably due to the difficulty in distinguishing between the "feel" of the relatively hard, partly frozen flesh, and the bones. Possibly more experienced filleters would not be bothered by this condition, however.

These tests, though only preliminary, indicate that immediate freezing of sea trout, with subsequent thawing, filleting and refreezing of the fillets, causes no marked adverse effect on quality over fillets prepared from freshly-caught fish and then frozen.



FREEZING FISH AT SEA



FREEZING EQUIPMENT ABOARD
A MODERN TUNA CLIPPER

The tuna fishery employed crushed ice as a refrigerant for many years before the inadequacy of this type of cooling was realized. It was when the tuna clippers extended their trips into sub-tropical waters that it became evident that it was impossible to carry sufficient crushed ice to return with fish in first class condition. During the middle 1920's some of the larger of the tuna clippers installed mechanical chilling, with ice as auxiliary refrigeration. These installations consisted of direct expansion coils directly under the deck and along the sides of the fish hold. The cork insulation was increased on the walls of the hold.

It was not until about 10 years later that a satisfactory method for refrigerating the tuna on the vessels was devised. At the present time, all of the larger tuna clippers make use of a brine chilling and freezing system for keeping the fish in good condition until they are brought to port.

--Fishery Leaflet 278



November 1948
Boston, Mass.

Samples of cod, hake, and haddock were frozen aboard the Albatross III for further study on freezing of fish at sea.

One lot each of round haddock and frozen round rosefish were stored in a commercial cold storage to determine the effects of prolonged cold storage on fish frozen in the round. With the exception of color, the fish frozen in the round from experiments conducted thus far seem to be superior in quality to iced and gutted fish of like species. The color of the fillets cut from iced fish was a bleached white, while the color of fillets cut from fish frozen in the round was darkened with a reddish tinge of blood vessels. The appearance, though not unsightly, was not that normally associated with commercially-produced fish products. Certain species of fish may have to be bled aboard ship before freezing to obtain a more desirable lighter color in the fillets. Further experiments are planned along these lines.

The relation of odor to trimethylamine content was consistent in that the odor, by organoleptic judgment, of fish frozen in the round at sea was considered superior to the odor of the fillets cut from duplicate samples of fish that were iced at sea. The percentage drip of fish frozen at sea was significantly lower than from fish iced at sea.

* * *

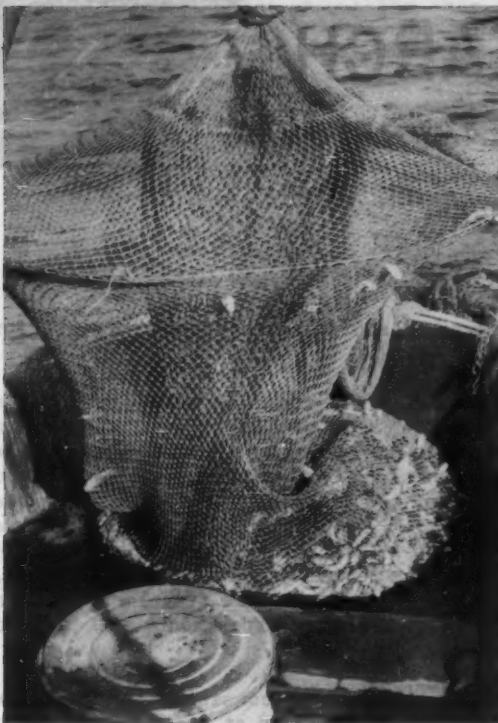
The first informal meeting of fishery technologists for the current season was held on November 4, and was attended by 25 technical men from the various companies in the New England area. A paper on "In-Plant Chlorination and Its Effect on Bacteria Reduction," by Stanley Hurley, was presented at the meeting.

Beaufort, N. C.

The testing of acetylated cotton twine, in cooperation with the Southern Regional Research Laboratory of the U. S. Department of Agriculture, was begun on November 9th. Arrangements were made for placing eight wooden test frames in a vertical position under water off one of the piers for determining the changes in tensile strength of the acetylated twines of different size in comparison with untreated and tar-treated twines on the same frames.

* * *

Aboard a regular shrimp trawling vessel, a test was conducted using a new experimental 50-foot shrimp trawl with an experimental tail bag (Figure 1), consisting of a bag with 1-inch mesh around the 2½-inch stretched mesh bag of the new experimental net with its extra entangling twines of soft cotton.



NEW EXPERIMENTAL SHRIMP TRAWL, INSIDE OF TESTING BAG, WHICH COLLECTED IMMATURE FISH THAT WERE ABLE TO PASS THROUGH THE INSIDE NET.

Numerous hauls were made to record the quantity of shrimp and immature fish caught in a regular 50-foot shrimp trawl in comparison with those caught in the new experimental net. The large outside tail bag net collected the small fish and shrimp that escaped through the large special mesh of the new experimental tail bag.

In 22 hauls, the new experimental net showed an escapement of young food fishes varying from 68.6 percent to 90 percent, consisting of spot, croakers, sea mullets, hogfish, trout, and butterfish having a length of 4 to 9 inches.

Analysis of the collection and escapement of shrimp in these 22 hauls showed an average of 70.4 percent of the shrimp was retained by the entanglement features of the new type net. The 29.6 percent which escaped consisted almost entirely of small shrimp ranging from 50 to 75 count per pound. Since the small shrimp are also able to escape through the 1-inch mesh that is used on most of the commercial shrimp trawls, there was no noticeable difference in the number of shrimp caught per haul in the regular net and the new experimental net.

College Park, Md.

During November 1948, additional packs using pollock and croaker were prepared for the sandwich spread project to determine the practicability of using whole ground fish. On examination of the packs, it was found that the bone did not grind well and gave a very gritty consistency. The bits of skin appeared like dark flecks in the finished product.

* * *

Analyses have been made of a wide variety of cooked fish and shellfish dishes. Typical analyses of several of these are as follows:

	Dry Matter	Protein Content	Fat Content	Calories per/100 gm.
Oven-fried rosefish fillets ..	43.9	20.1	13.7	236
Molded crab salad	24.3	10.7	5.7	118
Deviled shrimp	38.2	11.5	7.5	181
Clam fritters	55.1	11.7	11.1	267
Crab salad in eggs	23.9	13.8	7.5	128

* * *

Three hundred pounds of striped bass were obtained in a strictly fresh condition, and filleted, packaged, and frozen for the fluctuating temperature storage tests. No appreciable changes in quality are as yet noticeable in the striped bass fillets.

* * *

After three months of storage, tightly wrapped and loosely wrapped Boston mackerel fillets, held at constant temperatures of -10° F. and 0° F., and those in a tight wrap at temperatures fluctuating between -10° F. and 0° F., were still satisfactory as judged by palatability tests. Fillets in a loose wrap at temperatures fluctuating between -10° F. and 0° F. were on the borderline of acceptability. Unsatisfactory scores were obtained for the fillets held at 15° F., and the lowest scores were for those fillets held at fluctuating temperatures between 0° F. and 15° F. Fillets held at 15° F. and at fluctuating temperatures between 0° and 15° F. were extremely rancid. The quantity of "drip" upon thawing remains fairly constant for all samples.

Ketchikan, Alaska

For conducting studies of clam processing methods, large quantities of clams were dug and distributed into representative lots, some of which were tested raw and others processed in a variety of ways. The processed clams were extracted and tested with mice to determine the effectiveness of the various experimental processing procedures. The results obtained in the tests demonstrate that it is advantageous to process at high temperatures and for long periods of time. The addition of alkali to the canned product reduces the toxin, but when sufficient alkali is added to completely destroy the toxin, the quality of the clam meats has also been reduced.

Seattle, Wash.

Examination of control and refrozen fillets of yellowfin, rock, and lemon flounder, after a total storage period of five months at 0° F., indicated that with these species, refreezing did not result in serious changes in texture, did not increase the percentage drip of fillets on thawing, and did not result in adverse color or flavor changes. Lower ratings which have been received by fillets prepared and frozen aboard vessel in the Bering Sea have shown the importance of promptly and properly handling and freezing fillets aboard ship.

Samples of five species of flounder (English, sand, yellowfin, flathead, and rock) frozen in the round aboard the Service's vessel, *Washington*, in Alaskan waters, were thawed, filleted, packaged, and refrozen under commercial conditions at a local filleting plant. Preliminary examinations have substantiated the observations on the refrozen fillet series previously mentioned. Average yield of

skinned fillet from all five species was 29.0 percent. Estimation of labor costs for filleting and comparison of the yield figures with those from usual filleting operations indicated no great disadvantage in the handling of frozen Alaskan flounder.

* * *

In further studies of the precision of the AOAC method for determination of oil in fish meal, it was found that identical results were obtained with alundum or paper thimbles. Likewise, identical results were obtained with specially dehydrated acetone as with acetone containing small traces of water. Using the Bailey Walker extraction apparatus, it was found that the total extractives increased continuously with increasing time of extraction. Even after 124 hours extraction, a small increase in extractives was found upon subsequent additional extraction.



OVEN FRIED FILLETS



2 pounds fillets	1 cup bread crumbs
1 tablespoon salt	4 tablespoons butter or
1 cup milk	other fat

Cut fillets into serving size portions. Add the salt to the milk and mix. Dip the fish into the milk and roll in crumbs; place in a well greased pan. Sprinkle each piece of fish with melted fat. Place pan in a very hot oven 500° F. and bake 10 to 12 minutes. Serve at once on a hot platter, plain or with a sauce. Serves 6.

Cod, haddock, or other fillets may be used in the above recipe.

TRENDS AND DEVELOPMENTS

Abstract

A METHOD FOR EVALUATION OF THE NUTRITIVE VALUE OF A PROTEIN—(A Comparison of Broiled and Pan-fried Striped Bass Fillets), by Hugo W. Nilson, William A. Martinek, and Dorothy B. Darling.

A method has been proposed for the evaluation of the nutritive value of a protein which depends on feeding tests with growing animals. Approximately equal quantities of the test or comparison proteins must be consumed by all animals during the feeding period. The quantity of protein to be fed is limited to that which will not permit normal growth rate, but will permit good health. The basal diet consisting of sources of calories, vitamins, and minerals is allowed ad libitum. The effect on growth of the more important variables is corrected for by multiple regression.

It was found as an illustrative example that the proteins of broiled and pan-fried striped bass fillets possess equal nutritive value in respect to supplemental or balancing value. About 37 percent of the protein intake was found to be stored in the body during the 8-week period. Nine of 12 rats stored a mean of 11 percent of the total caloric intake as fat. They stored about 17 percent of the total caloric intake as combined fat and protein.

A review of literature and complete report of experimental data are published in Fishery Leaflet 296. A copy of this leaflet may be obtained from the Division of Information, Fish and Wildlife Service, Washington 25, D. C.



Additions to the Fleet of U. S. Fishing Vessels

A total of 98 vessels of five net tons and over received their first documents as fishing craft during October 1948, 19 less than in the previous month, and 33 less than in October 1947, according to the Bureau of Customs' Monthly Supplement to Merchant Vessels of the United States. Louisiana led with 16 vessels, followed by California and Washington with 14 vessels each. First documents as fishing craft were received by 1,059 vessels during the first 10 months of 1948 compared with 1,157 during the same period in 1947. Nearly two-thirds of the fishing vessels documented during the first ten months of 1948 had their home port in five States and Alaska.

California led with 166; followed by Louisiana, 145; Washington, 128; Texas, 84; Florida, 78; and Alaska, 75.

Vessels Obtaining Their First Documents as Fishing Craft

Section	October		Ten mos. ending with Oct.		Total
	1948	1947 ¹	1948	1947 ¹	1947 ¹
	Number	Number	Number	Number	Number
New England	1	4	43	49	55
Middle Atlantic	1	7	37	56	64
Chesapeake Bay	5	7	50	70	83
South Atlantic and Gulf	51	58	474	417	486
Pacific Coast	30	39	329	387	415
Great Lakes	6	6	42	40	45
Alaska	3	8	75	112	123
Hawaii	1	2	9	25	28
Puerto Rico	-	-	-	1	1
Total	98	131	1,059	1,157	1,300

1/Revised.

Note: Vessels have been assigned to the various sections on the basis of their home port.

Albatross III

SURVEY OFF SOUTHERN NEW ENGLAND: Scientists of the Service working aboard the research vessel Albatross III completed a survey of the fish populations on the continental shelf off southern New England on its 12th cruise (October 28-November 6, 1948). The area surveyed was between Martha's Vineyard and New York City. This is part of a continuing program to estimate the number of fish of various species on all of the New England banks.

On this cruise, the vessel occupied 35 stations and the net was towed 50 times. The principal species caught were whiting, scup, and butterfish. A large number of baby haddock were caught in the area south of Long Island. This is a rather unusual occurrence in this region and confirms reports that small haddock are being taken by commercial gear here.

Observations on the acid waste disposal area off Long Branch, N. J., started last spring, were continued on this cruise. About 80 pictures of the bottom were taken with the underwater camera in the disposal area and a control region. A net tow made in the disposal area caught whiting, red hake, butterfish, several species of flounders, small shad, and a number of small haddock.

The vessel will continue the survey of fish populations in the near future with 2 cruises to the waters off the Maine coast.

CONTINUES NET RESEARCH: Working aboard the Albatross III on its 13th cruise (November 18-19, 1948), Service scientists continued studies of nets designed to save small fish. The vessel fished in the area 10 miles south of Martha's Vineyard.

A special experimental net having four cod ends was used for these experiments which are designed to test the effectiveness of large mesh nets in allowing young fish to escape through the net. Large numbers of small fish are destroyed every

year by the present nets and this may be one of the causes for the lowered production of the New England banks.

Experiments were conducted last spring to determine the survival of fish passing through the net meshes. The present series carries on the large mesh experiments and will give information on the size of fish of various species which escape through the net and how fish would distribute themselves in the four cod ends.

Further cruises will be made in which various sizes of mesh will be used in the cod ends to test escapement.



ECA Procurement Authorizations for Fishery Products

There were no procurement authorizations for fishery products among the authorizations for commodities and raw materials announced by the Economic Cooperation Administration during December 1948. However, during the month, the amounts of two previous authorizations were decreased—an original authorization of \$128,800 for the purchase of canned fish from the United States for delivery to Greece was reduced by \$120,000 leaving only a balance of \$8,800 for this item; and an original authorization of \$800,000 for the purchase of shark liver oil from Chile for delivery to France was reduced by \$550,000 leaving only a balance of \$250,000. On the latter item, the country of origin was amended from Chile to any Latin American country except Brazil and the Argentine Republic.

Total ECA Procurement Authorizations for Fishery Products, April 1 - December 31, 1948

Product	Country of Origin	Procuring Agency	Recipient Country	Amount Authorized
Fish, canned	U. S.	Greece	Greece	\$ 8,800
Fish, salted	Newfoundland & Canada	Italy & Greece	Italy & Greece	7,259,000
Fish meal	Canada, Iceland, Norway, & Angola	Denmark, Austria, & U.S. Dept. Army	Denmark, Austria, & Bizone Germany	3,457,361
Oil, herring	Iceland	U.S. Dept. Army	Bizone Germany	1,694,000
" , seal	Newfoundland	France	France	257,600
" , shark liver	Latin America, except Argentine & Brazil		France	250,000
" , technical fish	U. S.	U.S. Dept. Army	Bizone Germany	100,000
" , whale	Netherlands, Belgium, & Norway	Austria & U.S. Dept. Army	Austria & Bizone Germany	7,192,150
Grand Total Authorized				\$20,218,911

1/Where the recipient country is shown as the procuring agency, the Government of the participating country or its authorized agents or importers do the purchasing.

Since most of the funds for the 15-month period from April 1, 1948, to June 30, 1949, have been allocated, there will be very few authorizations for fishery products through the balance of the period.



Federal Purchases of Fishery Products

DEPARTMENT OF THE ARMY, October 1948: Purchases of fresh and frozen fishery products during October 1948 by the Army Quartermaster Corps for the U. S. Army, Navy, Marine Corps, and Air Force for military feeding amounted to 1,516,239 pounds valued at \$566,426. The total purchases to date, January through October, totaled 14,188,555 pounds valued at \$5,068,245.



Inaugural Meeting of Indo-Pacific Fisheries

The Agreement to form an Indo-Pacific Fisheries Council for the investigation, development, and proper utilization of the aquatic resources of South East Asia, drawn up at Baguio, Republic of the Philippines, on February 28, 1948, has been accepted by the governments of France, the Republic of the Philippines, the United States of America, Siam, India, the Netherlands, and Burma. The Council came into being on November 9, 1948, when the fifth acceptance of the Agreement was received at FAO headquarters.

Article IX of the Agreement provides that it "shall enter into force upon the date of receipt of the fifth notification of acceptance." Notification from India, the fifth to be deposited, was received by FAO on November 9.

The inaugural meeting of the Indo-Pacific Fisheries Council will be held in Singapore beginning March 24, 1949. A copy of the provisional agenda follows:

PROVISIONAL AGENDA

1. Opening of Meeting by Director-General of FAO.
2. Election of Chairman and Vice-Chairman of the Council.
3. Adoption of Agenda.
4. Adoption of Conference Rules.
5. Appointment of Committees of the Conference (Credentials, Steering, and Drafting).
6. Organization of the Council.
7. Rules of Procedure of the Council.
8. Appointment of Technical Committees of the Council.
9. FAO Journeys Fund.
10. Technical Committees: Presentation of reports of interim working committees and discussion of Council activities.
11. Publications.
12. Budget (Travel and Publications).

Plans are also being made to hold a symposium on the subject of "Pelagic Fisheries," for which three evening meetings are being set aside.

Although the meeting is of primary interest to governments in the Indo-Pacific area, all Member Governments of FAO are invited to send representatives who, if their Government has not accepted the Agreement, will be received as observers.



International Fisheries Conference in Java

Two interim working committees of the proposed Indo-Pacific Fisheries Council, sponsored by the Food and Agriculture Organization, met at Boitzenzorg, Java, from October 8 to 15. Fishery representatives were present from the Philippines, Malaya, Singapore, North Borneo, Netherlands, Indonesia, and Hongkong to discuss present and proposed programs of research in the Celebes and Sulu Seas and adjacent waters. Following discussion of the reports, the meeting proceeded to consideration of means whereby the various programs might be integrated and their results most efficiently developed for the use of the nations represented. According to a report from the American Consulate at Batavia, the meeting passed a series of resolutions to these ends. A summarization follows:

Resolution I - In the absence of direct representation of the U. S. Fish and Wildlife Service and the Philippine Fishery Program, requests the Director of the Philippine Bureau of Fisheries to furnish the Secretariat with information especially on the biological results of the Philippine Fishery Program; and requests the Secretariat to establish formal contact with the U. S. fisheries program in this area to ensure its full participation in the activities of the Council.

Resolution II - Urges the Governments in possession of Japanese Oceanographic data relating to the Indo-Pacific area waters to make them freely available to all workers of the area.

Resolution III - Recommends that the Council at its Inaugural Meeting declare its interest in socio-economic problems, appoint a Technical Committee for social and economic work, and that urgent consideration be given to the methods by which fishermen might be freed from indebtedness preferably by the widespread foundation of Government Credit Organizations.

Resolution IV - Recommends to the Governments represented that coordinated oceanographical programs for the Celebes and Sulu Seas and adjacent waters be initiated to fit in with the current Philippine Fishery Program; that the Council fully coordinate the area's programs; and that the Secretariat propose a pattern of work for Indonesian operations in water east of the Halmaheras, and later for North Borneo operations in South China Sea.

Resolution V - To request the Secretariat to ascertain the observation and sampling program being followed by the Philippine workers and to recommend to member Governments that they adopt this as a minimum program.

Resolution VI - Since a major interest is the developing of pelagic fisheries in the Celebes and Sulu Seas and adjacent waters, recommends to the Governments represented that their hydrological and biological programs be as complete as possible; and recommends to the Council that this recommendation be presented to other Governments.

Resolution VII - Recommends to the Council the establishment of a panel of specialists to render advice, to make recommendation on methods of collection and observation, and where possible, to receive and handle collections made in the area; and that duplicate material of all collections made in the area be retained under the supervision of the specialists concerned with the groups represented.

Resolution VIII - Recommends to the Council that it encourage the establishment of more fellowships and the agreement of member Governments to the provision of reciprocal facilities for work.

Resolution IX - Recommends to the Council that it take steps to secure through its technical committees standardization of terminology and methods; and that the Secretariat undertake a compilation of existing conventions on standardization for the interim use of workers in the area.

Resolution X - Recommends to the FAO and to the Council that the functions of the Secretariat should include the maintenance of a Central Bureau to receive and collate results of the work in the area, and that the staff of the Secretariat should be expanded to include a technical assistant to handle the work.

Resolution XI - Recommends to the Council that the work of its technical committees be actively developed to include effective and continuing review of the progress of the area's programs.



Outlook for Fishery Products in 1949

CONSUMPTION AND PRICES: Civilian consumption of fish, especially of the fresh and frozen products, continued at a high rate during 1948. Supplies of fresh and frozen fish will be plentiful throughout the current winter season. Retail prices of these commodities probably will remain at current levels, according to an article prepared in cooperation with the Fish and Wildlife Service and appearing in the Bureau of Agricultural Economics publication, The National Food Situation.

PRODUCTION: Commercial fishing activities are likely to continue this winter in full swing so long as the weather permits. Commercial freezing of fish is expected to continue on a scale consistent with the supply of raw materials. Supplies of canned fish available for market early in 1949, probably will be no larger than a year ago. Although the 1948 pack of tuna exceeds last year's record output by a half million cases or more, the 1948 production of salmon was lower than in 1947. For the first time in history, tuna-fishing operations in 1948 were conducted in the waters adjacent to Alaska. In previous years, although tuna were occasionally caught in this area, fishermen concentrated their efforts on the salmon run.

IMPORTS: Imports of fish, especially fresh and frozen groundfish and rosefish fillets, are expected to continue at a high rate during most of 1949. Receipts of fresh and frozen fillets from Iceland may be larger than in 1948.

EXPORTS: Exports probably will be no larger than in 1948. Exports were low in 1948 relative to the levels reached in the two preceding years. This was due in large part to the shortage of dollar resources of foreign countries. This situation is likely to be a deterrent factor in the expansion of exports in 1949 above the preceding year's level.

AVAILABLE SUPPLIES: Supplies of fish, except possibly those of canned fish, are expected to be plentiful throughout most of 1949. Civilian demand for fish is likely to continue strong throughout most of the year. During the latter half, retail prices of fish could recede somewhat from early 1949 levels if market supplies of livestock products increase as is currently anticipated.



Pacific Oceanic Fishery Investigations

PROGRESS OF ORGANIZATION: The staff of the Pacific Oceanic Fishery Investigations, although as yet incomplete, initiated arrangements during October and

November to obtain permanent quarters at Honolulu. Until permanent space can be obtained or built, the temporary offices in Hawaii will be located in a vacant Navy building. The repairs and overhauling of two vessels acquired by the Investigations were delayed during October by the West Coast shipping tie-up. However, in November, the contracts for the work were awarded and reconditioning activities of the two vessels towards the end of the month were well under way.

Will Render Advice on U. S. Pacific Trust Territory's Fisheries: Following the announcement on September 29, that the State, Navy, and Interior Departments had approved the opening of the U. S. Trust Territory of the Pacific Islands to commercial fishing, the Pacific Oceanic Fishery Investigations was designated to represent the Department of the Interior in rendering advice on matters relating to the administration, regulation, and development of the fisheries of the Trust Territory. (See Commercial Fisheries Review, November 1948, page 68.) Later, during October, there was a similar designation with respect to American Samoa.

The Navy, in November, approved the log book and record forms prepared by the Investigations for the use of fishing companies and fishermen operating in the U. S. Trust Territory. Arrangements have been made to start the recording of data on these forms whenever fishing begins in the Investigations' area.

Bibliography of Pacific High Seas Fishes: By the end of November, a fairly extensive bibliography had been assembled of Japanese papers relating to the biology and technology of the Pacific high seas fishes and fisheries, particularly the tunas.



Per Capita Fish Consumption Increased in 1948

The per capita consumption of fish and shellfish during 1948 was 11 pounds (edible weight) compared to 10.8 pounds (edible weight) for 1947, according to a preliminary estimate released by the Bureau of Agricultural Economics, Department of Agriculture.

Per Capita Consumption of Fish and Shellfish

	1948 Prel.	1947	1946	1945	1944	Average 1935-39	1948 as a percentage of	
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	1947	1935-39
Fish (edible weight):								
Fresh and frozen	6.5	6.2	6.2	7.1	5.6	5.3	105	123
Canned/	4.5	3.8	3.8	2.6	2.6	4.8	98	78
Cured8	1.0	.9	.7	1.0		
Total	11.0	10.8	11.0	10.6	8.9	11.1	102	99

1/Excludes canned food products containing small quantities of fish; i.e., clam chowder, etc.

Although the 1948 figure is slightly higher than 1947, it is still slightly below the average for the period 1935-39. The 1948 estimated consumption was 102 percent of 1947 and 99 percent of the 1935-39 average.



Puerto Rican Fishing Vessel Ceases Operations in North Atlantic

The Reina del Caribe, a 70-foot Puerto Rican auxiliary dragger-seiner, owned by the Puerto Rican Agricultural Company, was ordered to cease operations in the

North Atlantic in October 1948, according to the Service's Fishery Marketing Agent in Mayaguez, Puerto Rico. This vessel fished out of Gloucester for rosefish during the summer of 1948, and in December was anchored at Brielle, New Jersey. (See Commercial Fisheries Review, October 1948, page 28.)



Virginia's 1948 Menhaden Catch Declines

PRODUCTION: The total menhaden catch in Virginia during the 1948 season, which ended in October, was 40,200,000 pounds (60 million fish) below the 1947 season, according to a November 15 report from the Service's Fishery Marketing Specialist at Weems, Va. In 1948, the total menhaden landings by a fleet of 18



BRAILING MENHADEN FROM THE PURSE SEINE

boats was 131,320,000 pounds (196 million fish) compared with 170,180,000 pounds (254 million fish) in 1947. The individual vessel catches for 1948 ranged from a high of 10,570,000 pounds (about 16 million fish) to a low of 4,207,000 pounds (6 million fish). The fish were processed by six plants which ceased operations at the end of the season. However, some of the menhaden boats departed for southern waters to follow the fish in their fall migration. These vessels will land their trips at southern factories for processing on a percentage basis.

PRICES: Menhaden oil prices during 1948 started at 20 cents per pound, dropped to 12 cents, and towards the middle of November were about 14 cents per pound. A number of firms made a practice of selling their oil on contract rather than on the basis of current quotations. The highest price in menhaden fishing history was paid for oil during the fall of 1947, when it sold at 21 cents per pound.

In Virginia, most of the scrap produced by the menhaden factories is sold before being ground into meal. The menhaden scrap prices are partly governed by the analysis of its nutrient content. During the early part of November 1948, the price leveled off to about \$100 per ton. After ceiling prices were removed in 1946, it sold at \$100 per ton, but at the end of 1947, it reached \$110 per ton and a few tons actually brought \$140 per ton during the winter of 1947.

YIELD: The yield of scrap remains fairly constant at around 70 tons for every 670,000 pounds of fish (one million fish). The yield of menhaden oil was as low as .014 gallon for every 670 pounds of fish (one thousand fish) at Reedville during July 1947. Of course, fish can be received at the factory in such a condition of putrefaction that the oil yield is even less, but such a yield would lose its significance. At the other extreme, are yields of 9.94 and 13.26 gallons for every 670 pounds of fish (one thousand fish) at Reedville during October 1948.

As yet, there is little movement in Virginia toward recovering stickwater concentrate, a valuable byproduct of oil settling.

Wholesale and Retail Prices

The wholesale index for all commodities as of November 16, 1948, continued to drop and was 0.4 percent less than October 12, but still 2.8 percent higher than November 18, 1947. On the other hand, wholesale food prices showed a slight increase of 0.1 percent over October 12, 1948, but were still 1.4 percent less than November 18, 1947, according to the Bureau of Labor Statistics of the Department of Labor.

At Seattle, the wholesale average price of canned pink salmon during November 1948 was 1.7 percent lower than the previous month, but still 18.7 percent higher than November 1947. Canned red salmon remained steady at the same average price which prevailed during September and October 1948, and was only 5.9 percent higher than in November 1947.

Wholesale and Retail Prices

Item	Unit	Nov. 16, 1948	Oct. 12, 1948	Nov. 18, 1947
Wholesale: (1926 = 100)				
All commodities	Index No.	164.3	-0.4	+2.8
Foods	do	177.5	+0.1	-1.4
Fish:				
		<u>Nov. 1948</u>	<u>Oct. 1948</u>	<u>Nov. 1947</u>
Canned salmon, Seattle:				
Pink, No. 1, Tall	\$ per doz. cans	5.812	-1.7	+18.7
Red, No. 1, Tall	do	6.649	0	+ 5.9
Cod, cured, large shore, Gloucester, Mass.	\$ per 100 lbs.	15.00	0	+ 3.4
Retail: (1935-39 = 100)				
All foods	Index No.	<u>Nov. 15, 1948</u>	<u>Oct. 15, 1948</u>	<u>Nov. 15, 1947</u>
Fish:		207.5	-1.9	+2.4
Fresh, frozen, and canned	do	328.1	+0.7	+8.5
Fresh and frozen	do	268.1	-0.8	+2.2
Canned salmon:				
Pink	\$ per lb. can	61.3	+3.2	+20.9

The continued substantial drop in food prices as of November 15, 1948, marked the fourth consecutive month in which the retail food index has declined. From the record high reached in July 1948, retail food prices have dropped more than 4 percent to a level of only 2.4 percent above November 1947. The retail fresh and frozen fish index, which reached a peak on October 15, 1948, of 270.2 percent of the 1935-39 average, followed the trend of other foods and as of November 15, 1948, dropped 0.8 percent compared to the previous month, but was still 2.2 percent higher than November 1947. The retail fresh, frozen, and canned fish index continued to climb, and on November 15, 1948, reached a peak of 328.1 percent, 0.7 percent higher than mid-October, 1948, and 8.5 percent higher than November 15, 1947. The increase in November was mainly due to the continued increase in prices of canned fish. Canned pink salmon at retail, on November 15, 1948, was 3.2 percent higher than the previous month and 20.9 percent higher than on November 15, 1947.





Argentine Republic

CANNED FISH IMPORTS DECLINE: The marked decline in Argentine imports of canned fish is caused, to a considerable extent, by the increasing domestic production. This is a logical sequence resulting from the present import restrictions and falling value of the peso, which greatly increase the price to the consumer, according to a recent report in the Canadian publication, Foreign Trade, of November 6.

Canned Sardines: Sardines are undoubtedly the most important canned fish imported. There is a good demand for such fish and, since it is not produced locally, it must be imported from abroad either fresh, salted, or canned. The bulk of the sardines imported are packed in olive oil, although there are also certain quantities imported in tomato sauce. Most of the imports from the United States are pilchards packed in tomato sauce in oval tins of 15 ounces (425 grams). Spanish sardines are supplied in tins of various sizes from 4.6 ounces (130 grams) up to 2.2 pounds (1 kilogram). Smoked sardines are not popular, although they are supplied from Norway in small quantities.

Argentine Imports of Fishery Products

Year	Canned Sardines in Oil or Sauce		Canned Oysters		Other Canned Fish & Shellfish	
	From U.S. lbs.	Total lbs.	From U.S. lbs.	Total lbs.	From U.S. lbs.	Total lbs.
1947	-	-	-	308,167	-	-
1946	-	15,954	-	60,346	-	-
1945	-	373,241	-	17,079	-	-
1939	320,852	3,329,126	45,285	245,126	-	455,440
1938	251,139	5,419,603	39,435	980,839	-	519,891
1937	130,929	6,501,590	55,700	1,064,965	-	613,512

1/Includes mussels, winkles, and similar shellfish.

Canned Oysters: Import data on canned oysters include mussels, winkles, and similar shellfish. These are consumed in large quantities in most restaurants, where they are served as an oyster cocktail. They are shipped mostly in tins of 14 ounces (400 grams) or of 2.2 pounds, whereas, the canned oysters from the United States are mostly shipped in 6-ounce tins. Although they have a limited outlet owing to the high price, oysters are well liked. Other suppliers of canned oysters were Portugal, the United Kingdom, and Chile.

Other Canned Fish and Shellfish: As with other fish imports, purchases of sardines were practically nil during the war. Other suppliers were Sweden, France, Japan, and Belgium. During the three postwar years, 1945, 1946, and 1947, imports came exclusively from Brazil and Chile. On April 30, 1947, the Argentine Central Bank suspended the granting of import permits for sardines packed in oil or sauce.

The principal imports of other canned fish during the period 1937-39 were squid in oil and in its natural state, tunny fish in oil, and anchovies from Spain

and Portugal; squid and tunny from Italy; crab and crawfish from Japan. In addition, a few cases of canned salmon were supplied by the United Kingdom and by Russia, but this trade was insignificant. A wide variety of other canned fish is shipped, generally in olive oil, from Spain, Portugal, and Italy. Included in this group are clams, herring, bonito, and a few others. However, compared with canned squid and tunny, the trade in these fish is unimportant.

Possibilities for Canned Fish Limited: Even if the exchange regulations are removed, there would seem to be little hope of greatly increasing normal imports of canned fish into Argentina. In addition, the large proportion of the population of Italian and Spanish descent forms a more natural outlet for the canned fish produced in those countries. Insofar as Argentina is concerned, food and, particularly, fish, is not an essential item of import.



Australia

STATE OF VICTORIA TO IMPROVE FISH MARKETING FACILITIES: The Government of the State of Victoria in Australia is considering plans for the erection of freezing depots at each of the eight main fishing ports, as well as the provision of adequate storage facilities both at these ports and in the metropolitan area, according to the Canadian periodical, Foreign Trade, of November 20, 1948. This will enable stocks to be built up during the summer months when the catch is high, to provide for a controlled release during the winter months when few fish are taken.

The scheme envisages later the introduction of modern hygienic packing and more efficient distribution to inland areas. It is confidently felt that, when the plan has been implemented, retail fish prices will be materially reduced and greater quantities of fish will be sold.



Bizone Germany

GERMAN FISHING VESSELS: The German shipbuilding industry, which had begun a modest recovery prior to the currency reform on June 20, 1948, lost many of its outstanding contracts as a result of cancellations by would-be purchasers, as well as from a lack of funds to finance construction, according to a November 4 report from the American Consulate at Hamburg. Under an Allied Control Council agreement, 100 fishing trawlers were to have been constructed in German yards.

Definite approval was given for the construction, or completion (some of the vessels were already nearing completion), of a first series of 34 vessels according to the specifications for the Seebeck-Werft type:

Length	140 feet	Capacity of holds	3,200 baskets
Draft	13.5 feet		(about 350,000
Motor	600 hp.		pounds)
Speed	10.5 knots	Size of the vessel	400 gross tons

The size and allocation of the additional 66 trawlers to be constructed have not yet been determined.

There are 51 fishing vessels, each in excess of 400 gross-registered tons, now being used by German fishing concerns. Of the 51 vessels, 27 are owned by German fishing companies and 24 are vessels being operated for the German economy by German fishing companies, although title to the 24 vessels is retained by the United States (to 14 vessels) and by the United Kingdom (to 10 vessels), in accordance with allocations made by the Tripartite Naval Commission.

The final disposition of the 51 fishing vessels in excess of 400 gross-registered tons each, as well as the disposition of the additional six vessels which may be completed, has not yet been determined. Presumably, all these vessels would be withdrawn from service when their total tonnage could be replaced by the construction of new 400 and 350 gross-registered-ton trawlers.



Chile

NEW SOURCE OF VITAMIN OIL: The Ministry of Economy and Commerce has announced that an organization has been formed to produce vitamin oils from dogfish caught off the Chilean coast between the bays of Tolten and San Pedro (roughly latitudes 39° to 41°), according to a November 3 report from the American Embassy at Santiago, Chile. The extracting plant will be located at Valdivia and the oil (a large part of which is to be for export to Argentina) will be refined by a semi-government organization long engaged in similar enterprises.



Colony of Mauritius

FISHERIES REVIEW, 1947:^{1/} Production: The total catch recorded in 1947 at all controlled stations from which catch records are collected amounted to 3,207,693 pounds compared to 3,364,402 pounds in 1946, according to a September 17 report from the American Consulate at Mombasa, Kenya Protectorate.

Table 1 - Controlled Catch

	1947	1946
	Pounds	Pounds
Nets	892,910	884,875
Basket traps	1,195,865	1,326,888
Lines	350,882	343,763
Octopi	711,682	674,621
Lobsters	50,398	76,419
Sharks	-	57,836
Miscellaneous	5,956	-
Total	3,207,693	3,364,402

Conditions Affecting the Fishermen: The total quantity of fish landed by the professional fishermen in 1947 amounted to:

	Pounds
Controlled catch	3,207,693
Uncontrolled catch - Estimated	440,920
Retained by the fishermen for their own consumption - Estimated	440,920
Total	4,089,533

^{1/} See Commercial Fisheries Review, March 1948, page 36.

The average catch was about 2,000 pounds per man, which represents an earning of \$259 to \$305 per annum. The equipment used is very inadequate at present.

Maximum production has nearly been reached (4.4 million pounds) and intensification of deep sea fishing by present methods and equipment cannot be expected to bring in more than 441,000 to 661,000 pounds more every year.

Fish Available for Consumption: There is no doubt that much more fish could be absorbed if fish were cheap and the consumer used to a larger ration.

A comparative table of quantities available in 1947 and prewar follows:

Table 2 - Fish Available for Consumption

	1947	1936-38 Average
	Pounds	Pounds
Fresh fish, production (edible portion) ^{1/}	2,420,000	1,817,200
Canned fish, imports	187,000	809,600
Salted fish, imports (edible portion) ^{2/}	2,613,600	2,301,200
Total available for consumption	5,220,600	4,928,000

^{1/}55% of total catch equals edible portion.

^{2/}Double the actual quantity of actual imports equals edible portion.

Sharks: A large number of sharks were examined during the year by the Fisheries Branch of Mauritius and the following were recognized:

Seven species of Eulamia, by far the most common being Eulamia leucas (Bull shark).

Galeocerdo arcticus (Tiger shark).

Megaprim brevirostris (Lemon shark).

Mistelus canis (Dogfish).

Squalus sp.

Sphyrna tudes (Hammerhead).

Sphyrna zygoena (Hammerhead).

Fishing experiments for sharks with nets and with baited hooks have been carried out during the year.

A few sharks were taken among which was a 14½-foot Eulamia. Its liver yielded four gallons of oil.



Iceland

LATEST DEVELOPMENTS IN THE FISHERIES: Expansion of Fisheries: The Althing, the Icelandic legislative assembly, which convened on October 11, discussed the Marshall Plan signed on July 3 by Iceland, according to a November 16 report from the American Legation at Reykjavik. Iceland's four-year plan, submitted to ECA, was subjected to close scrutiny. Iceland anticipates financial aid through ECA to construct the following several major projects which include, among other items, herring liquefaction plants, a fertilizer plant, several fish meal factories, and several refrigerating plants. In addition, Iceland will endeavor under this plan to expand her merchant and fishing fleets and other major activities. The plan calls for an estimated increase of fish production by 34 percent; from 552,000 metric tons (1947) to 738,000 metric tons (1952).

Floating Fish Processing Factory: The floating fish processing factory, purchased under the 2.3 million-dollar ECA loan to Iceland, arrived on October 16

in Reykjavik. The vessel, Haeringer (6,900 tons d.w.), is undergoing reconditioning and will probably be utilized this winter for processing herring on the fishing grounds. If the undertaking is successful, similar vessels of this type may replace the construction of expensive herring factories. Preparations are being made for the opening of the herring season due to begin in November. Last year's catches of winter herring were unprecedented in the history of Iceland's winter herring fisheries.

Whaling: The whaling season, which commenced on May 1, came to a close on October 11 with a total catch of 239 whales.

Frozen Fish Fillets for Europe: An ECA conditional aid grant of \$3,500,000 will make available to European countries participating in the ERP, about 8,000 metric tons of Icelandic frozen fish fillets.



Japan

CALIFORNIA-TYPE PURSE SEINER SUCCESSFUL: A Japanese firm reported the successful results of an experiment with the Shirayuki Maru, the first California-type purse seiner, according to a report from the Natural Resources Section of SCAP. On August 3, 1948, the first day of operations, 65 miles southeast of Todogasaki, Miyagi Prefecture, 70 metric tons of bonito were caught in two hauls. The Shirayuki Maru is a new 100-ton, 250 hp. purse seine boat.

EXPERIMENTAL REFRIGERATED TUNA SHIP: A Japanese refrigerated tuna fishing vessel, Banshu Maru, returned to Tokyo after a month of tuna fishing with a fleet of three catcher boats, according to the September 11 Weekly Summary of SCAP. This project was an experiment to determine whether the refrigerated mothership method is practical for maintaining a high-quality product for export and, at the same time, financially profitable under existing fishing conditions.

The Banshu Maru brought in 138 tons of products, including 23 tons of albacore, 11 tons of bluefin tuna, and 41 tons of swordfish. The albacore was frozen in the round form, and the bluefin and swordfish were filleted and frozen. The bulk of the product is expected to be canned, although a portion of the albacore may be exported. The landed cargo represented 90 percent of an estimated production over an allotted time. Although a high-quality product resulted from quick refrigeration at sea, operational difficulties were encountered, especially in transferring the catches from the catcher boat to the refrigeration ship under adverse sea and weather conditions. In addition, the cost of this initial voyage is not expected to be covered by the sale of the products. The experiment will serve as the basis for planning future projects of this type.

BONITO FISHERMEN TO CONVERT TO PURSE SEINING: Several Japanese bonito fishermen want to convert to the American method of purse seining, according to the November 6 Weekly Summary of SCAP. This method of operation may increase production of present boats, especially when the boats are working schools of fish which refuse to take the hook. Because some question exists as to whether the American method of purse seining for bonito will be successful in Japanese waters, the Japanese Fisheries Agency will approve only a few of the 20 applications to convert.

BONITO CATCH - 1948: The Japanese Bonito and Tuna Association estimated the bonito catch in 1948 at 64 million pounds, compared to an average of 224 million pounds in 1936-38 and 144 million pounds in 1947. The number of boats averaged 674 in 1948, 560 in 1947, and 580 in 1936-38. Gross tonnage of these fleets increased from 33,000 tons in 1936-38 to 49,000 tons in 1947, and 59,000 tons in 1948. The amount of catch per ton of fishing boats decreased from 6,800 pounds of fish in 1938 to 3,200 pounds in 1947 and 1,200 pounds in 1948.

The decrease in catch in 1947 and especially in 1948 may be due principally to changes in coastal currents affecting the availability of the schools, and a reluctance of the fish to take the hook. Because of the poor bonito season, most of the bonito fishing boats plan to engage also in tuna fisheries, particularly during the winter when considerable emphasis is placed on offshore fishing for tuna.

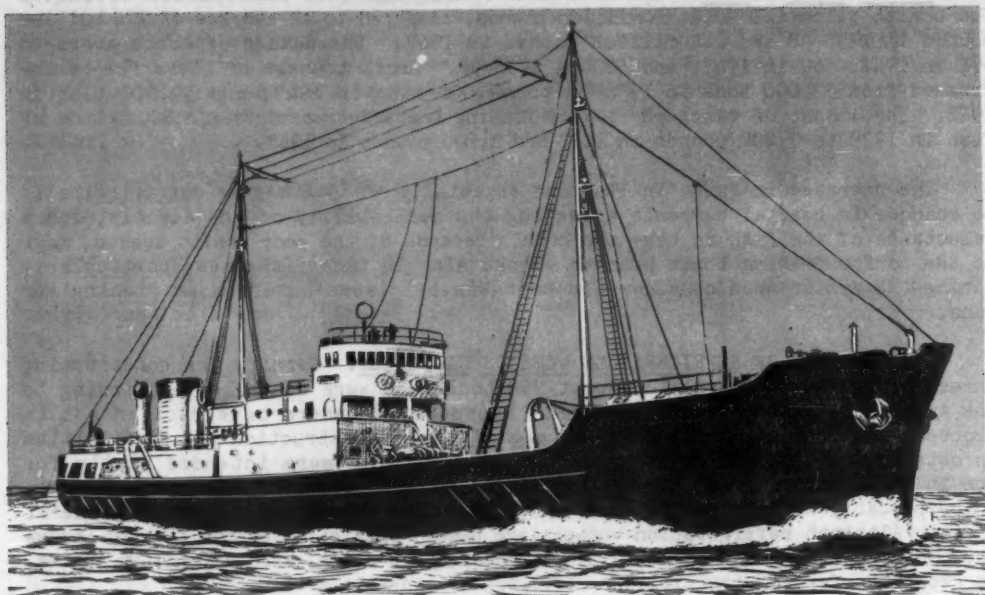
CONSTRUCTION OF REFRIGERATION VESSELS CANCELLED: Permits for constructing three refrigeration vessels of about 750 tons each were cancelled, according to the August 28 Weekly Summary of SCAP. Prospective owners have decided not to proceed with the building because of high costs of construction and difficulties in obtaining refrigerating machinery. These vessels were intended partly for use in transporting fish. Instead of the three refrigeration vessels, three cargo ships probably will be built for use in carrying both processed fish and general cargo. Although refrigeration vessels are needed critically by the fishing industry, it appeared advisable to obtain additional cargo ships, also critically needed, as prospects for constructing the refrigeration vessels are uncertain.

CONVERSION OF FOUR SHIPS TO FISHERY VESSELS: Two applications for the conversion of four vessels were approved, according to the October 2 Weekly Summary of SCAP. The first application requested permission to convert two 99-gross-ton steel tuna boats into trawlers and to remodel a Japanese ex-naval vessel into a fisheries school ship. The second application requested permission to remodel a Japanese ex-naval craft into a refrigerator vessel for use in transporting fish and seafood products. The above conversions will not increase the over-all size of the Japanese fishing fleet above the level previously approved by the Supreme Commander for the Allied Powers.

FISHING IN MEXICAN AND ARGENTINE WATERS: Japanese fishing in Mexican and Argentine waters before World War II was done only by members of one Japanese company, according to the August 21 Weekly Summary of SCAP.

Operations in Mexican Waters: In 1935, boats were sent to the waters off the west coast of Mexico and into the Gulf of California on an exploratory and experimental cruise. No appreciable quantity of fish was taken. Commercial operations began in 1937 when two large diesel-powered trawlers were sent to these waters from Japan. During 1938 and 1939, five and nine small trawlers, respectively, were sent to the same area, in addition to the two large boats. These boats, all diesel powered, which weighed from 80 to 100 tons, fished with small otter trawls. Nine of the small trawlers fished also in 1940, the last year of operations, and the number of large trawlers was increased to four.

The four large trawlers, owned and equipped by a Japanese company, were based in Tobata, and the bases of operation in Mexico were Mazatlan and Guaymas. All funds and equipment came from Japanese sources, and the boats returned to Japan each year for repairs. The smaller Danish-type trawlers were repaired in Mexico.



TYPE OF LARGE JAPANESE DIESEL TRAWLER WHICH OPERATED IN MEXICAN WATERS

In 1936, all the crew members were Japanese. From 1937-40, the Mexican Government required that about 50 percent of the crew be Mexicans and that it include a Mexican inspector who was to acquaint himself with the fishing operations.

About one-half the catch of shrimp and all other fish caught were sold in Mexico and sent to markets in southern California. The remaining shrimp were frozen and shipped aboard Japanese merchant ships to Japan, via Los Angeles. Small quantities of shrimp were bought by the Japanese from the fishing association at Topolobampo, Mexico.

Wages of the crews and shore help (all Mexican) were paid with money received from local sales of the fish and shrimp. Purchases of fuel oil at Los Angeles also were made with these funds.

Operations in Argentine Waters: Operations in Argentine waters were conducted by a corporation formed by a Japanese company and by private Argentine financial interests. The Japanese contributed boats, gear, and crews, and the Argentinians furnished money for operating expenses.

Fishing began in Argentine waters in 1936, using two large trawlers with crews and gear from Japan. About five Argentinians worked as crew members during 1936, and an Argentine co-captain was assigned on each boat. The ownership of the boats was transferred to the Argentine company, and their registry was changed to Argentina. The original gear had come with the boats, but replacements were obtained in Argentina. The two large diesel trawlers from Japan were the only boats used in this fishery.

In 1937, the Argentine Government ruled that 25 percent of the crew should be Argentinian, and in 1940, this figure was increased to 60 percent. The remainder of

the crew was Japanese. By 1940, nine of the 23 Japanese fishermen had been hired from among Japanese residing in Argentina.

All catches of these boats were sold in Argentina.

INSTITUTIONS THAT PUBLISH FISHERIES RESEARCH MATERIAL: The institutions listed below publish material that is important to fisheries research in Japan, according to the October 16 Weekly Summary of SCAP. Summaries or larger parts of each publication are in English, so the studies are suitable for publication exchange with fisheries research agencies in other countries.

Name	Address
Hakodate Fisheries College	Kameta, Hakodate, Hokkaido
Hokkaido Fisheries Experimental Sta.	Yoichi, Hokkaido
Fisheries Institute, Faculty of Agriculture, Hokkaido University	Sapporo, Hokkaido
Fisheries Institute, Faculty of Agriculture, Tohoku University	Katahiracho, Sendai City
Fisheries Institute, Faculty of Agriculture, Tokyo University	Hongo, Bunkyo-ku, Tokyo
Fisheries Experimental Station of Fisheries Agency	Tsukishima, Kyobashi, Chuo-ku, Tokyo
First Fisheries Institute (Tokyo Fisheries College)	Kurihama, Kanagawa Prefecture
Science Institute for Natural Resources	Hyakunin-cho, Okubo, Yodobashi-ku, Tokyo
Fisheries Institute, Faculty of Agriculture, Kyoto University	Maizuru, Kyoto Prefecture
Fisheries Institute, Faculty of Agriculture, Kyushu University	Hakozaki-cho, Fukuoka City, Fukuoka Prefecture

PROCESSING METHODS AND INSPECTION STANDARDS OF FISHERY PRODUCTS SURVEYED:

An attempt is being made to improve processing methods and inspections standards in the Japanese fishing industry so that a maximum percentage of quality fish will be available for export.

A special technical adviser from the United States surveyed processing methods and inspection standards of fishery products in Japan, according to the September 11 Weekly Summary of SCAP. Albacore intended for export is received and processed at 11 major ports in Japan and 10 of these ports were visited.



PACKING FISH IN ICE IN A JAPANESE PLANT

Sanitation and Inspection Standards:

Sanitary conditions of the cold storage plants were in a passable condition, although a few exceptions were found. The storage compartments in some of the plants contained, in addition to export fish, large quantities of domestic fish products stored in wooden boxes. Frozen albacore appeared to be in an excellent state of preservation, perfectly glazed, and displayed no rejective defects. Storage and freezing temperatures were sufficient to preserve the fish properly. However, the exact

degree of freshness or decomposition of hard frozen fish is impossible to determine, and satisfactory examinations can be made only when the fish are thawed to a degree where the elasticity of the flesh can be tested and flesh odors are released.

Canning factories were inspected for sanitation and for methods and procedures of plant operations. With the exception of fly screening of windows and doors, proper cooling rooms for pre-cooked fish, and a system for rodent control, plant sanitation was satisfactory.

Preparation of albacore for canning displayed high-quality workmanship. Examination of the canned products showed the fish to be of excellent quality; the cans registered from two to ten inches of vacuum; had normal can and meat odors; good color; firm texture; and no honeycomb was noted. A sufficient amount of salt and good quality cottonseed oil was added.

Since Japanese fishermen believe that crushed ice melts faster than block ice, they continue to use the antiquated and unsatisfactory system of taking 300-pound blocks of ice to the fishing grounds and breaking them into chunks for storing the fish on the boat. Most Japanese fishing boats carrying albacore partially fill the hold with sea water and add chunks and blocks of ice as a brine refrigerant. Data recently procured disclosed that a maximum of 30 percent of all albacore landed was in passable condition for export.

Facilities for transporting frozen fish from receiving ports to shipping centers are inadequate.

All frozen and canned tuna intended for export to the United States is examined by Boeki Kodan, a part of the Boeki Cho (Foreign Trade Board), before the time of processing. At present, 29 inspectors are stationed in the ports where tuna intended for export are received. These inspectors are instructed and supervised by six chief inspectors who train them in grading procedures and quality-standard requirements. Before arrival of a fishing boat, inspectors are notified by radio so that they can be present when the boat docks. Data relating to the time of catch, length of trip, age of fish, and quantity of ice used are collected. The fish are carried by hand from the boat to the refrigeration plant. The inspectors then check each fish for elasticity of flesh, color of skin and eyes, cuts, splits, scuffing of the skin, and odor and color of the gills. Only fish free of defects are selected for export.

Processing Methods and Standards: One of the most pressing problems facing the Japanese industry is to prepare frozen and canned tuna, especially albacore (white meat tuna), for export. Tuna export is being resumed for the first time since 1939. Even though the total amount of exportable albacore may not exceed 1,000 metric tons and is, therefore, not extremely important insofar as size or value is concerned, the opportunity for export is important to the over-all Japanese problem of utilizing marine products. If fishermen, fish processors, transportation officials, and exporters establish a high standard both for operating technique and quality in export fish, the accomplishment may be used as an example of what can be done with existing facilities and may encourage progressive leaders of the fishing industry to take the lead in establishing higher-quality standards for fish intended for domestic use.

No technological improvement of consequence has been made in the Japanese fishing industry for many years.

The immediate problem facing the Japanese tuna fishing industry is to improve operating conditions to a point where they will be comparable to tested and proved methods used in other countries.

RECOMMENDATIONS FOR IMPROVEMENT OF FISHERY PRODUCTS PROCESSING METHODS: Based on the above study of the Japanese fish processing industry, recommendations were prepared to guide Natural Resources Section and military government personnel in assisting the fishing industry to improve processing methods, according to the September 18 Weekly Summary. Some of the recommendations can be made effective immediately. Others are included for reference and long-range planning. The recommendations are:

1. **Canneries:**

- a. Equipment used in preparing fish should be of non-corrosive metals. Stainless steel is especially good; galvanized iron or aluminum is satisfactory.
- b. Floors and equipment should be cleaned thoroughly, preferably with a good detergent, hot water, and steam, at the end of each day's operation. All rodent-harboring refuse should be eliminated.
- c. Windows and doors should be screened. Large fans blowing outwardly through open doorways are effective against the entrance of insects and also provide air circulation.
- d. Clean clothing, adequate head coverings, and sanitary wash rooms and toilet facilities are essential for all employees. Each employee should wash his hands with clean water and detergent upon entering and leaving the toilet room.
- e. Each retort should be equipped with an indicating mercury thermometer, recording thermometer, steam pressure gauge, steam and water spreader, and condensate valve. An adequate number of properly spaced vents should be installed on each retort. A daily production record should be kept, containing details such as packing date of product, its variety, container size, processing number, batch number, codes, number of containers in each batch, sterilization temperature, and duration of sterilizing process. Coding on can lids should be die embossed to show date of pack, plant name, and product and style of pack. This procedure is recommended especially for export processing.

2. **Cold Storage Plants:**

- a. Sanitation in freezing and storage rooms should be maintained. Duck boards should be used to permit proper air circulation. Fish should be tiered or racked so that air can circulate about them, and export fish should be stored in separate rooms.
- b. Precaution should be taken to insure that freezing coils in storage and freezing compartments do not leak, because ammonia gas is absorbed by fish. Defrosting of coils should be periodic to prevent excessive ice encrustation, which decreases maximum freezing efficiency. Circulation of air by fans is recommended for a faster decrease in temperature.

3. **Boat Refrigeration:**

- a. Modern ice crushing facilities are recommended for all docks and plants where boats are loaded with ice. By using the blower system for loading crushed ice, boats can carry 20 percent more ice. This system loads 50 tons of ice per hour.
- b. Boats using ice should be equipped with mechanical refrigeration to conserve ice and fuel oil and to permit 20- to 30-day trips with minimum spoilage.
- c. A recommended method of using ice with mechanical refrigeration: normally, one ton of crushed ice suffices for two tons of fish. The vessel is filled with ice by a blower with a long flexible hose leading into the holds. When stowing fish, the

bottom banks of refrigeration coils are turned off to permit water from the ice to drain into the bilge to be pumped overboard. The bilge must be pumped frequently, because seepage into storage holds thaws the bottom layers of fish. Over a bottom layer of ice six inches deep, fish are placed belly down in single layers, with at least four inches of ice between each layer. After storage, top coils only are turned on, thus allowing the ice to melt very slowly. Albacore, a delicate fish, must be stored very carefully. A partial filling of the hold at first will settle crushed ice about the fish and protect the bottom layers from crushing. After the filling, the ice will settle from melting. Ice should be added so that the top fish are entirely covered at all times.

d. The brine freezing system is the most practical for preserving tuna on vessels. The hold has six to ten tanks or wells of 8 to 30 tons capacity each, with air-tight hatch covers, water inlet and outlet, and refrigeration coils. These tanks are filled with sea water chilled to 30° F. and the fish are placed in them for 24 to 30 hours. After the fish are glazed, the tanks are drained and refilled with clean brine, pre-chilled to 10° F. Fish should be completely frozen within 72 hours. The tanks are again drained, and the hard frozen fish are kept at 18° to 20° F. by dry refrigeration. Vessels using this system can make 90 to 120-day trips and deliver catches in excellent condition.

4. Transportation:

a. High priorities should be established for moving fishery products from receiving ports to shipping centers, and only first-class equipment should be used. Hard frozen tuna for export should be transported in refrigerated vessels. Storage of the product on the refrigerated vessel until it is loaded on the transport ship would reduce handling and eliminate much spoilage.

U. S. SUPPLIES FISHING EQUIPMENT: The United States Government recently supplied fishing equipment and supplies amounting to more than \$15,000,000 to Japan so that production of aquatic products in the coming year can be maintained, according to SCAP. Although these materials are in Japan and are now being distributed in the form of nets, twine, and rope, small fishermen do not have funds to purchase them. It is the responsibility of the Japanese Government to take action to insure that these materials reach the fishermen and that the fishermen are adequately financed to purchase the materials.

VIOLATIONS OF AUTHORIZED FISHING AREA: A representative of Natural Resources Section of SCAP, addressing a meeting of the Tuna and Bonito Association in Tokyo, August 10, 1948, declared that many conditions in the fishing industry have improved in the last six months, according to the August 14 Weekly Summary of SCAP. These improvements include greater supplies of fishing materials, decreases in the black market, raising the status of the Japanese Bureau of Fisheries to Fisheries Agency, and recent increases in fish prices. However, in one major respect conditions had become worse. Violations of the authorized fishing areas had increased. At the association meeting six months ago, its members were urged to cooperate with the Government in controlling violations. Natural Resources Section representatives emphasized that increasing violations are adversely affecting the fishing industry in various ways. Because of the seriousness of the situation, the Japanese Fisheries Agency was instructed to take immediate action in developing a more adequate program for obtaining compliance with SCAPIN 1033, which defined the Japanese fishing area.

According to the October 9 Weekly Summary, a delegation from the Trawler Association of Japan reported on the success of their efforts, in cooperation with the Japanese Government, to curb the violations of the authorized fishing area by trawlers fishing in the East China Sea. Their report agrees with other information received by the Natural Resources Section indicating no violations by trawlers during August and September. (See Commercial Fisheries Review, November 1948, page 54.)

Norway

CATCH FLUCTUATIONS DEMAND FURTHER STUDY: Viewing the expanding industrial activity based on Norway's fisheries, Norwegian oceanographers and biologists have voiced the warning that past experiences with the surge and slump of coastal cod and herring fisheries accentuate the need for further studies of the fish and their periodic movements. The Oceanographic Director of the Norwegian Bureau of Fisheries recently outlined known data on these periodic fluctuations for a group of scientists in Bergen. He observed that two types of fluctuations have been noted on the Lofoten cod banks: year-to-year periodicity as well as fluctuations over longer intervals, according to the Royal Norwegian Information Service.

It was noted that there appears to be a correlation between the yield of the Lofoten Banks and the distribution of cod in eastern Arctic waters near Spitzbergen and Bear Island. Rises and falls in the latter districts have paralleled those off the Norwegian Coast. Recent observations may forecast another change in the offing, as fisheries off Bear Island and Spitzbergen have again shown a downward trend. It has at the same time been observed that banks in these regions are to an increasing degree being cooled by waters of a very low temperature. In case hydrographical conditions influence the habitat of the cod by extending or contracting its feeding grounds, there is a possibility that the progressive influx of cold water on the banks will cause a reduction of the food supply thereby affecting the stock with respect to quantity and quality. There is evidence to show that the Arcto-Norwegian stock of cod is declining at the present time.

Similar fluctuations are noted when the past centuries of coastal herring fishing are analyzed. Studies have shown that periods when herring are plentiful off the Norwegian coast have a duration of from 50 to 80 years with intervening periods of slump lasting from 30 to 60 years. The present upsurge in herring fisheries appeared about the turn of the century.

The Oceanographic Director admitted that while the present deep-sea fishing fleet could operate in other areas, thus diminishing the effects of a possible fisheries slump, the prospects of such a situation should continually be borne in mind.

FISH SCALES LAUNCH A NEW INDUSTRY: Scales of the herring are providing raw material for a new Norwegian industry. The thin luminous film which coats the fish scales is being processed by two new Norwegian firms into a pearl paste now in high demand by celluloid, plastic, and bakelite industries. The product is also used in the manufacture of artists' colors and nail polish as well as artificial pearls.

A highly complicated process, the manufacture of pearl paste was a carefully guarded production secret until the last decade. German firms earlier produced the bulk of this product, importing their raw materials from Norway. Purchasers of the new Norwegian export item are pleased with its high quality. With its extremely rich herring fisheries, Norway is in a good position to expand output to meet growing demand.

NEW GIANT FLOATING WHALE FACTORY DELIVERED: The 23,500-ton Thorshøvd, newest of Norway's floating whaling factories, was delivered by Danish shipbuilders on October 19. Within ten days after delivery, the vessel's owners had stocked it with supplies for the winter's whaling season, and by the month's end, the Thorshøvd was on its way to join the Norwegian whaling fleet in Antarctica.

With delivery of the new vessel, Norway's whaling fleet has regained its pre-war tonnage. Aboard is a complete plant for the processing of the whale—rendering tanks, refineries, etc., all of the most modern design. A 100-ton blue whale, for example, can be prepared for the rendering tanks within 90 minutes after it is hauled aboard. Daily capacity of the Thorshøvd is from 20 to 25 blue whales. Ten catching vessels operate out from the mothership. With cabin accommodations for over 400 men, the ship is a city which is isolated from the rest of the world for nearly 6 months of each year. Special attention has been paid to adequate recreation rooms, libraries, and a powerful radio receiving unit.

PLAN FILLET EXPORTS TO U. S.: Experimental shipments of Norwegian fish frozen in cellophane-wrapped pound packages have met with real success in the mid-western United States, according to Norwegian fish exporters. The Royal Norwegian Information Service reports that preliminary shipments sent early this spring were followed by a 200-ton export of packaged cod, haddock, and assorted types later in the year. Present plans anticipate sizable shipments of Norwegian frozen fish to the United States early in 1949.

Though the Norwegian export product must compete with American fish as well as fish from Canada and Iceland, Norwegian frozen fillets compete most favorably in price and quality with other brands. A number of Norwegian freezing plants have already indicated their intention to pack for the American market during the coming fishing season.

WHALE MEAT PROCESSING RESEARCH: Whether the whaling waters of Antarctica may, in time, provide quantities of fresh "sea beef" for the tables of meat-hungry Europe is to be determined by scientists accompanying Norway's whaling expeditions to the South Polar areas this season. Until now, the principal source of fresh-frozen whale meat has been land-stations on the Norwegian coast. Limited exports of this cellophane-packaged product have proven highly popular—particularly in England—where its reasonable price and beef-like quality have created a growing demand.

Before whale beef from Antarctica can be marketed in similar fashion, research must unravel numerous technical problems; i.e., how long the meat will keep without refrigeration. With the present whaling system, a certain period must pass between the time the whale is harpooned and the time it reaches the factory ship. For best results, whale beef should be frozen with a minimum of delay.

A complete laboratory has been fitted out aboard Norway's newest whaling factory ship. The Thorshøvd scientists will spend the season in the field to determine why the thousands of tons of meat now simply regarded as a source of oil cannot be frozen there in Antarctica to help relieve the European meat shortage.



Portugal

FISHING INDUSTRY OF MAJOR IMPORTANCE: The Portuguese fishing industry is of major importance to Portugal, according to the Canadian Trade News of September 1948. Portuguese waters are rich in fish; sardines are produced in large quantities and are of good quality and, consequently, can command a good price in export markets; tuna and anchovies are also produced. However, sardine runs are decreasing and this explains why Portuguese sardine production has been declining since 1945.

An average of about 50 percent of the country's domestic needs for cod are filled by the catch of Portuguese fishermen who each year fish on grounds off the coasts of Canada and Newfoundland, and the balance is imported. The Portuguese cod catch in the fiscal year 1947-48 amounted to 33,719 metric tons of green fish which yielded 23,146 metric tons of dried fish.

Under the corporate structure of the country, several guilds and commissions are concerned with cod imports. Deliveries under the 1947-48 contracts, now expired, were made from Norway and Newfoundland as follows:



PORTUGUESE SARDINE ASSEMBLY LINE SHOWING OIL MACHINES AUTOMATICALLY ADDING OLIVE OIL TO FILL THE CANS.

Portuguese Dried Cod Imports

	Metric Tons
Norway	25,018
Newfoundland	8,899
Total Imports	33,918

The wholesale prices for cod, small, medium (corrente), and large, ranged from about \$27 to \$32 for lots of about 132 pounds. Prices at which all cod is sold are determined by the Comissao Reguladora do Comercio de Bacalhau (Cod Trade Regulating Commission). As to the cure, it was indicated that the Newfoundland type is preferred; i.e., hard, light salt, and natural.

In the current season, the Portuguese authorities, especially the Conselho Tecnico Corporativo (Corporative Technical Council) which controls import permits and exchange licenses, have been more and more inclined to prefer, as much as possible, imports from "soft currency" countries and to conclude compensatory deals, such as those with France and Belgium.



Republic of Panama

BAIT FISHING DECREE AMENDED: The Minister of Agriculture, Commerce and Industries of the Republic of Panama issued on August 3, Decree Number 564, which amended Article One of Decree Number 408, permitting fishing for bait by large sea-going vessels within Panamanian waters, according to a November 1 report from the American Embassy at Panama. The text of the Decree follows:

Article One of Decree No. 408 of April 27, 1946, is amended in order to permit the fishing for bait in the waters to the South of eight degrees forty-seven minutes (8°47') North Latitude, instead of eight degrees thirty minutes (8°30') same Latitude, as fixed by the mentioned Decree.



Republic of the Philippines

FISHERIES REVIEW, 1947: Introduction: The fisheries of the Philippines are considered to be the second industry in the Islands, being preceded only by agriculture, according to a December 1 report from the American Embassy at Manila. Marine products are practically the sole source of animal protein food for the great majority of the population and they afford employment, both part time and full time to many people of both sexes.

Production: Fisheries are divided into two sections: the commercial fisheries, which employ people devoting the major part of their time to take or rear fish



BANGOS PONDS. IN MANY LOCALITIES IN THE PHILIPPINES, ONLY A DIKE TO SURROUND THE AREA IS NECESSARY IN ORDER TO MAKE A POND OF ANY SIZE DESIRED.

for the market and the subsistence fishing, carried out by a large segment of the population of the provinces who supply their needs for this food when they are not otherwise employed. It is estimated that as much fish is caught by the latter type of activity as by the former. There is no definite statistical collection of data in the field except in certain places, mainly the ten principal cities where district fisheries offices are maintained. Fish handled outside

of these cities are generally unaccounted for in the figures.

The Philippine Bureau of Fisheries reports that there was an increase in powered fishing vessels operating in the Philippine Islands from 344 in 1946 to 482 in 1947. In addition, 3,385 acres of new areas for fish ponds were leased by the Government to private operators which gives a total of 154,492 acres of swamp lands devoted to that purpose. Fish landed at certain selected points in 1946 totaled 35.2 million pounds; whereas, in 1947, landings at the same places had increased to 46.2 million pounds. Estimates by the Philippine Bureau of Fisheries of total production of fish from the sea and from fish ponds in 1947 amounted to 426.8 million pounds.

Consumption: Consumption of fish in the Philippines is considered by the Philippine Government to be in the neighborhood of 21.35 pounds of sea food per person per annum. This is less than one ounce of fish per person per day and it is recognized as being much too low an estimate.

Filipinos in the past consumed approximately $4\frac{1}{2}$ ounces of sea food per person per day. The increase in population plus the devastation wrought in the industry by the war, together with the void left in the production system by the removal of Japanese fishermen, who were a major factor in this system, before World War II, have, without a doubt, reduced this level. Most authorities agree that consumption is at least half of the prewar level and total production is now probably at about 880 million pounds per annum. That production is increasing is also evidenced by the fact that the price of fish has been slowly dropping during the past year. A

conservative estimate would seem to indicate that the drop is from 34 cents per pound to 23 cents per pound.

Fisheries Being Rehabilitated: Rehabilitation of the fisheries is going on constantly. Private capital is finding a ready outlet in the fishing industry and encouraging increases in operating units have been noted all over the Islands. Many small ports which previously depended upon manual fishing now have powered vessels operating from them; and under the guidance of the Philippine Bureau of Fisheries and the United States Fish and Wildlife Service's Philippine Fishery Program, which is operating in the Islands to assist in fisheries rehabilitation, the effort is being gradually expanded to new grounds. Offsetting this, however, is the tendency to overfish the most readily accessible and proven areas.

Canned Fish Imports: Significant gains are noted in the imports of canned fish.

In 1949, probably a number of the imported foodstuffs will be placed under import control. Import of canned fish may be restricted as the local fishing industry is developed.

Philippine Imports of Fish (In Metric Tons)				
	1948 (Jan.-June)	1947	1946	1935-39 average
Fresh	177	93	25	154
Canned	23,275	41,797	20,455	13,964
Cured	701	1,261	798	1,863

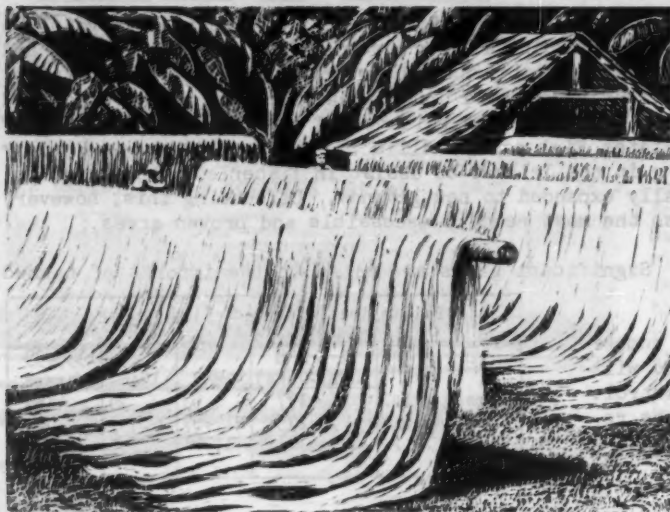
MANUFACTURE OF NETTING: The first steps toward Philippine sufficiency in fishing gear are to be consummated in the immediate future with the establishment of net manufacturing mills in the Philippines, according to the Philippine Bureau of Fisheries and the Fish and Wildlife Service's Philippine Fishery Program.

One of the objectives of the Philippines for the past three years has been to secure an adequate supply of fish nets. After all sources of supply had been explored, it was concluded that the only answer to the Philippine problem was to establish an industry within the nation for this purpose. Two mills are now in prospect which together will produce approximately 20 percent of the nation's requirements. It was indicated that operations will be underway early in 1949 and that netting will be in fair supply by the middle of the summer. In the meantime, no efforts to increase the supply of netting on the Philippine markets are being relaxed.

TO TEST RAMIE FISHING NETS: Tests will be conducted of Philippine produced and processed ramie fibers for fish netting, according to a November 10 report. The tests will involve the construction of panels of netting made from ramie twine and placing these panels in actual service aboard the Service's vessels now operating in the Philippines.

One of the earliest uses suggested for ramie fiber was fish netting and fishing gear twine. The development has been slow due to certain difficulties inherent in the processing of the ramie plant. One American concern is reported to have expended \$250,000 in an effort to adapt ramie for netting manufacture, and abandoned the attempt due to the fact they were unable to get a sufficiently flexible twine that would knot and still retain its strength under vigorous fishing conditions. Experts believe that this difficulty can now be overcome as the result of experiments conducted on these fibers for the past several years. The problem has been to prepare a twine with a high degree of elasticity and at the same time retain the native toughness and wearing qualities of the ramie fibers.

With the impending establishment of netting mills in the Philippines it is desirable that native fibers of dependable quality be available. Three fibers



RACKS OF ABACA PLANT FIBERS SET OUT TO DRY AT DAVAO, ON THE ISLAND OF MINDANAO, WHERE SOME OF THE FINEST QUALITY ABACA IS PRODUCED.

produced in the Philippines hold greatest promise. They are abaca, cotton, and ramie. The demand for abaca for other uses is at present time very great and its use in local netting in large quantity would present economic difficulties and probably result in a fishing gear beyond the price range of the fishing industry's ability to pay. Cotton, which has been almost universally used for many years in the heavier types of fish nets such as otter trawls, otterseines, and similar items, while produced

in the Philippines, is too limited in supply and by current practices, probably too expensive to produce to compete with foreign-grown cotton. Improved agricultural practices might produce an adequate supply of cotton that would be suitable for netting purposes, but present production is inadequate. Ramie, on the other hand, is relatively inexpensive and can be produced advantageously in the Philippines, according to current information.

The estimated annual consumption of cotton nettings and twine in the Philippines is valued at about 2½ million dollars. Practically all of these needs at the present time are imported either in the form of webbing or twine. It is hoped to reduce this annual imported item by substituting ramie which is now grown in the Islands.



Spain

FISH CANNING: The Spanish fish canning industry was developed primarily as an export business, but for various reasons, its export trade is at a standstill and the general position of the industry is precarious, according to an October report from the American Consulate at Vigo. Factors which continue to affect the industry adversely are shortages of tinsplate, lead, and rubber. But the major problem is the loss of its foreign markets due to the unfavorable exchange rate of the Spanish peseta. Portuguese cannerymen quote a case of sardines packed in oil (100 cans of 1¼ Club 13 mm.) at \$12.00 c.i.f., whereas, the lowest price at which Spanish cannerymen can quote is \$32.00 f.o.b. Portuguese canned fish is replacing Spanish in many foreign markets.

The Spanish Government had promised to supply the industry with requirements of materials at officially fixed prices sufficiently in advance of the canning season, but for one reason or another it has not yet delivered the supplies (except olive oil) which had been allocated for January and February of this year. The 1948 allotment of tinsplate is still short and the impression is gained that no more shipments will be made for many months to come. The manufacture of tinsplate and other items has been suspended, according to reports, owing to the lack of tin and iron.

Some canners are reported to have made exports to several countries at prices below cost of production in order that they might realize in foreign exchange 33 percent of the value of the merchandise which is permitted by the Spanish Government, and use it for the purchase of foreign materials and equipment for their factories.

Another factor which adversely affected the canning industry was the small size of the catches of preservable varieties of fish. Sardines and bonito (albacore) which are the principal species, were delivered in such small quantities that packers by agreement rotated their purchases at the fish auctions in order to avoid, by competition among themselves, a further inflationary price for fish.



Sweden

NEW FREEZING PLANT: Seven tons of frozen fish per day is the capacity of a new freezing plant just completed on the Swedish west coast, according to the October 30 issue of the English periodical Fishing News. The plant, which can store some 100 tons of frozen fish, was built by a Swedish company which is expecting to find a market for frozen fish, especially cod, on the Continent. By the end of this year, the company's products will be available in Sweden.



Union of South Africa

STATUS OF FISHERIES: Fish products are in plentiful supply in South Africa and there is an exportable surplus of approximately 8,000,000 pounds of canned fish and approximately 3,500,000 pounds of canned crayfish and 1,500,000 pounds of fresh or frozen crayfish tails, according to an October report from the American Legation at Pretoria. The Gold Loan Agreement provides for 13,500,000 half pound tins of canned fish for the United Kingdom. The United States secures substantial quantities of frozen crayfish tails.

The annual fish catch of about 100,000,000 pounds has an important and beneficial effect principally on the urban consuming population. Fish forms an integral part of the diet in private homes and in commercial restaurants and hotels. The urban population and even small villages have fish made available to them. It is a food crop of growing importance for the domestic market as well as for commercial exportable supplies. The fishing industry has expanded considerably in recent years. There is a limit of 6,000,000 pounds placed by the South African Government on the amount of crayfish products which can be exported but otherwise there are no restrictions limiting the expansion of the fishing industry.



FEDERAL ACTIONS



Department of the Army

TO PROCURE FISHING VESSELS FOR BIZONE GERMANY: The Office of the Chief of Transportation of the Department of the Army, on December 20, announced that a limited number of vessels meeting certain requirements will be procured, repaired in American shipyards, outfitted, and dispatched to the United States Zone of Occupation, Germany, for use in the German economy.

The following lists the requirements for the steel fishing trawlers and outlines the procedure to be followed by present owners in submitting offerings:

Under authority of Public Law 413, 80th Congress, the contracting officer of the Office of the Chief of Transportation will receive proposals for the furnishing of one or more new or used fishing vessels with characteristics as outlined below:

- Type - Must be rigged and fitted as an otter trawler.
- Hull Construction - Steel.
- Length Between Perpendiculars - Not less than 100 feet.
- Moulded Beam - Not less than 23 feet.
- Propulsion - Diesel, single screw.
- Total Brake Horsepower - Not less than 550.
- Fuel Capacity - Not less than 10,000 gallons.
- Cruising Range - Not less than 20 days.
- Fish Hold Capacity - Not less than 250,000 pounds.
- Age - Not over 20 years.
- Gross Tonnage - Not less than 200 tons.
- Hull and Machinery - Must be complete and in good serviceable condition.
- Equipment - Must be fully furnished with all necessary gear, loose equipment and appurtenances.

Written offers from owners for sale of trawlers meeting the description outlined above will be used as a basis for negotiation.

Prior to final acceptance of any offer the Government will conduct surveys, afloat and withdrawn from the water, on such vessels as are considered potentially suitable. Owners must be in a position to pass title free and clear of any and all liens, liabilities, mortgages and encumbrances.

Complete, detailed information on hull and machinery as well as inventory of all gear, equipment, spare parts, etc., together with the name and official number of each vessel should accompany each offer. Photographs and plans if available should also be submitted with each offer together with information relative to where and when the vessel may be inspected.

It is requested that a separate bid for each vessel offered stating the lowest price covering delivery at Boston, Massachusetts, be submitted to the Department of the Army, Office Chief of Transportation, Water Transport Service Division, Washington 25, D. C. Envelopes containing bids should be marked "Bid for Fishing Trawler."

Department of the Interior

SECRETARIAL ASSIGNMENTS ANNOUNCED: Secretarial assignments have been announced for Assistant Secretaries of the Department of the Interior as follows:

Assistant Secretary Davidson; Bureau of Land Management, Bureau of Mines, Geological Survey, National Park Service, and, as a special problem area, the Pacific Northwest.

Assistant Secretary Warne; Bureau of Reclamation, Bureau of Indian Affairs, Fish and Wildlife Service, and, as a special problem area, Alaska.

For the special problem areas, the Assistant Secretaries will be responsible for formulating Department programs and maintaining continuing supervision over Department and bureau programs and activities in the areas. They will handle all correspondence and orders, and matters of policy, program, or administration requiring action at the Secretarial level within their areas. Matters relating to these areas, but arising in bureaus or offices assigned to other members of the Secretary's staff, the matter shall first be considered by the area supervisor and then be referred to Secretary to whom the bureau or office is assigned.



Department of State

ANNOUNCEMENT OF INTENTION TO ENTER INTO TARIFF NEGOTIATIONS, APRIL, 1949: The interdepartmental Trade Agreements Committee issued formal notice on December 17, 1948, of intention to negotiate with Colombia and Liberia for reciprocal reduction of tariff and other trade barriers and for accession of these countries to the General Agreement on Tariffs and Trade concluded by the United States and 22 other countries at Geneva, Switzerland, on October 30, 1947. Colombia and Liberia will join with 11 other countries in the negotiations scheduled to begin at Geneva on April 11, 1949. The Trade Agreements Committee notice was accompanied by publication of lists of articles (no fishery products included) on which United States tariff concessions might be considered in the negotiations with Colombia and Liberia.

The Trade Agreements Committee also published on December 17, 1948, supplementary lists of articles (no fishery products included) on which United States tariff concessions might be considered in the forthcoming negotiations with 9 of the 11 countries regarding which notice of intention to negotiate was given and lists were published by the Committee on November 5, 1948. (See Commercial Fisheries Review, December 1948, page 63.) Those countries are: Denmark, the Dominican Republic, Finland, Greece, Haiti, Italy, Peru, Sweden, and Uruguay. No supplementary lists have been issued for the remaining two countries, El Salvador and Nicaragua.

INTERNATIONAL CONVENTION FOR THE REGULATION OF WHALING IN FORCE: The International Convention for the Regulation of Whaling which was signed at Washington on December 2, 1946, was proclaimed by the President on November 19, 1948, according to the Department of State. The President's proclamation is effective from November 10, on which date the Netherlands Government deposited with the Department its instrument of ratification of the Convention. Since instruments of ratification had been pre-

viciously deposited by the United States, Australia, Norway, the Soviet Union, the Union of South Africa, and the United Kingdom, this action by the Netherlands was the last step required to bring the Convention into force between those Governments. In addition, Iceland, which had not signed the Convention, has given to the Department notification of its adherence to the terms of the Convention, and Panama has informed the Department of its intention to apply the Convention provisionally pending definitive approval in accordance with its constitutional requirements. These notifications became effective on November 10, 1948, the day on which the Convention entered into force.

Advice and consent to the ratification of the Convention on behalf of the United States was given by the Senate on July 2, 1947.

The principal objective of the Convention is to provide long-range regulation for the whale fisheries in order to secure proper and effective conservation of whale stocks, to prevent further depletion of certain species of whales which have for some time been subject to overfishing, and to promote the orderly development of the whale fishery with due regard to all pertinent conservation, economic and nutritional considerations. (See Commercial Fisheries Review, January 1947, page 44).

Whaling operations during the forthcoming Antarctic season, scheduled to open on December 15, 1948, shall be governed by the provisions of the Schedule (annexed to the Convention and contains specific regulations upon such matters as protected species, open and closed seasons, open and closed waters, and size limits) as they now stand, since any new regulations which may be adopted by the Commission may not become effective prior to July 1, 1949.

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U. S. FILES RESERVATIONS TO CONTINENTAL SHELF PROCLAMATIONS: In regard to the proclamations issued by certain Latin American countries, extending claims to jurisdiction over the resources of the continental shelf, including the fishery resources, the Department of State for the first time has publicly issued a statement regarding the filing of reservations with the various countries involved. The Deputy to the Special Assistant to the Under Secretary of State, on October 15, wrote as follows to the Service as well as to a number of other members of the fishery industries interested in international fishery developments:

The United States Government has reserved its rights and interests with respect to the execution of the so-called continental shelf decrees of Argentina, Chile, and Peru. The decree of Chile, issued June 23, 1947, and that of Peru, issued August 1, 1947, asserted the national sovereignty of each country over a belt of coastal seas 200 marine miles in breadth and over the submarine platform to a similar distance seaward. The Argentine decree, issued October 9, 1946, claimed national sovereignty over the continental shelf and the seas above it. The decrees were stated to be based upon the precedent of the Presidential Proclamations of September 28, 1945 which set forth the policies of the United States with respect to the resources of the sea bed and subsoil of the continental shelf and with respect to the conservation of fisheries in certain areas of the high seas.

In filing its reservations, the United States, in similar notes to the three countries, emphasized that it viewed with the greatest sympathy the desire of Argentina, Chile, and Peru to conserve and perpetuate the coastal fisheries and the resources of the sea bed and subsoil in the seas and shelf contiguous to their respective coasts. At the same time, however, the United States felt that the decrees were at variance with the generally accepted principles of international law in that they asserted sovereignty over large areas of the high seas outside the limits of territorial waters and failed to accord appropriate and adequate recognition to the fishing interests of the United States and other nations in the high seas off the coasts of the respective countries. In these regards also, the United States felt that the principles underlying the decrees differed in large measure from those of the United States Proclamations. Accordingly, the notes continued, the United States felt bound to reserve its rights with respect to the execution of the decrees.

Interstate Commerce Commission

FREIGHT RATES INCREASED: On December 29, the Interstate Commerce Commission issued an order granting the nation's railroads temporary freight rate increases. These increases may be placed into effect on not less than five days' notice to the public. Further action on the railroads' petition for permanent rate increases will be taken in ensuing months when the Commission will hold hearings in each of the four rate territories. (See Commercial Fisheries Review, December 1948, page 20.)

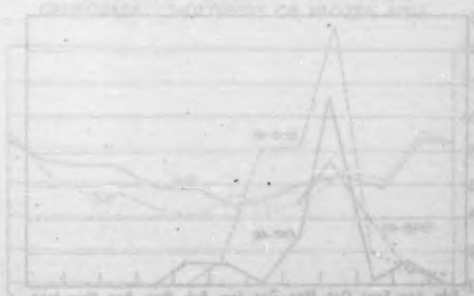
The temporary increases which the Interstate Commerce Commission has allowed to be placed into effect for all fishery products are as follows:

Within eastern territory	- 6 percent
Within southern territory	- 6 "
Within zone I of western trunk-line territory	- 5 "
Within western territory other than zone I of western trunk-line territory	- 4 "
Interterritorially, between eastern territory and southern territory	- 6 "
Interterritorially, other than between eastern and southern territories	- 5 "

The Commission stated that it has not been shown on the record of the proceedings that the increases proposed in the rates and charges for protective service published in Perishable Protective Tariff No. 14, Agent Quinn's I.C.C. 25, will be just and reasonable, and such charges are exempted from any increase.

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SINGLE NATIONAL SCALE FOR EXPRESS RATES: In an order issued December 29, the Interstate Commerce Commission has authorized the Railway Express Agency to place into effect nationally its so-called Western scale of rates. (See Commercial Fisheries Review, November 1948, page 32.) These rates apply on less than carload first and second class traffic and may be published upon notice to the Commission and to the general public by not less than thirty days filing and posting in the manner prescribed in Section 6 of the Interstate Commerce Act. The Western rates are about 10 percent a hundred pounds higher than the present Eastern-Southern scale. This particular order does not apply to commodity rates under which a large percentage of fishery products is transported. It is estimated that less than 25 percent of the fishery products shipments will be affected.

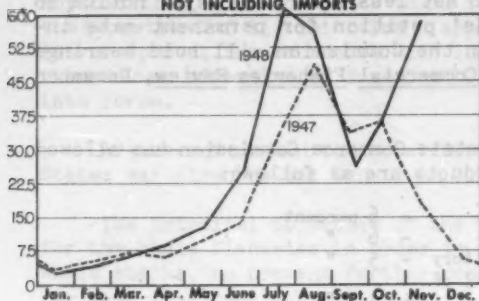


LANDINGS AND RECEIPTS

In Millions of Pounds

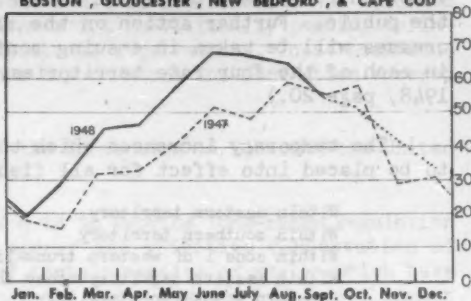
MAINE - LANDINGS *

NOT INCLUDING IMPORTS



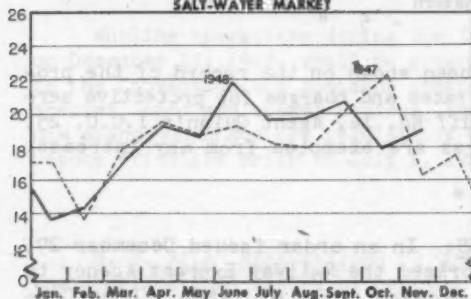
MASSACHUSETTS - LANDINGS

BOSTON, GLOUCESTER, NEW BEDFORD, & CAPE COD



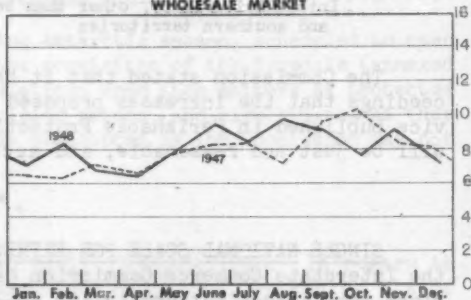
NEW YORK CITY - RECEIPTS OF FRESH & FROZEN FISH

SALT-WATER MARKET



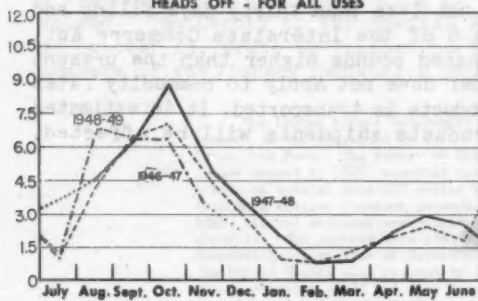
CHICAGO - RECEIPTS OF FRESH & FROZEN FISH

WHOLESALE MARKET



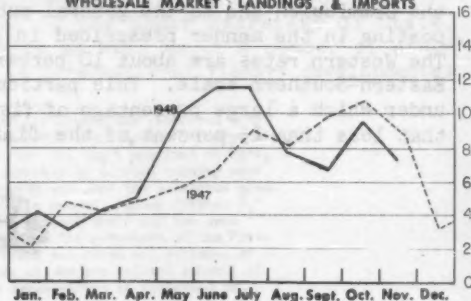
GULF - SHRIMP LANDINGS

HEADS OFF - FOR ALL USES



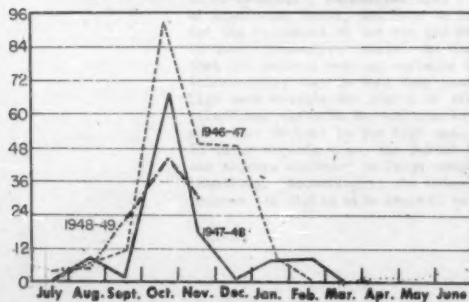
SEATTLE - RECEIPTS OF FRESH & FROZEN FISH

WHOLESALE MARKET, LANDINGS, & IMPORTS

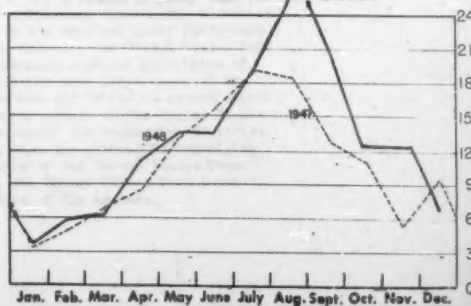


In Thousands of Tons

CALIFORNIA - PILCHARD LANDINGS



CALIFORNIA - TUNA LANDINGS

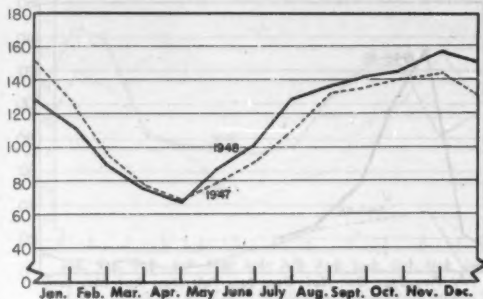


--- ESTIMATED
 * REVISED

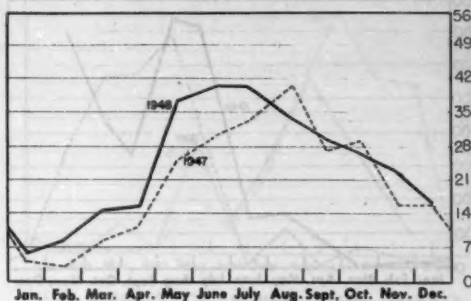
COLD STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS

In Millions of Pounds

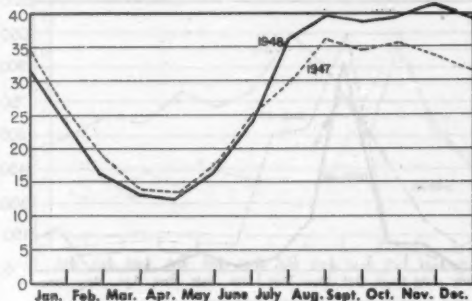
U.S. & ALASKA - HOLDINGS OF FROZEN FISH



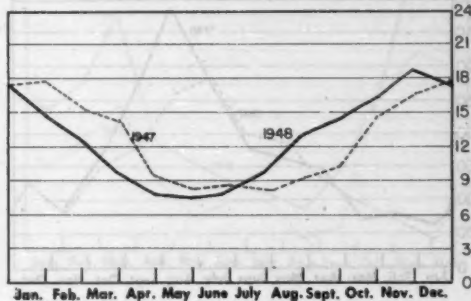
U.S. & ALASKA - FREEZINGS



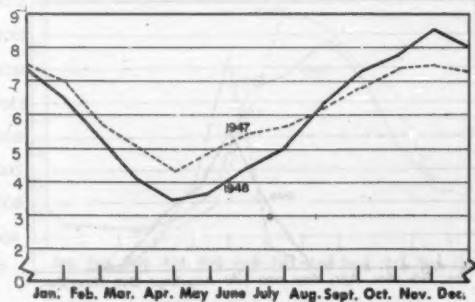
NEW ENGLAND - HOLDINGS OF FROZEN FISH



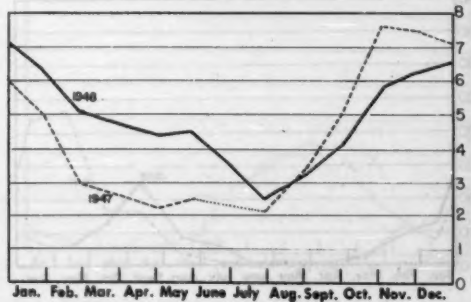
NEW YORK CITY - HOLDINGS OF FROZEN FISH



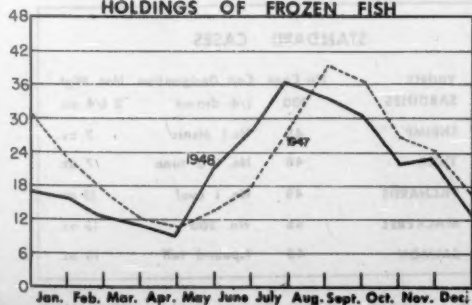
CHICAGO - HOLDINGS OF FROZEN FISH



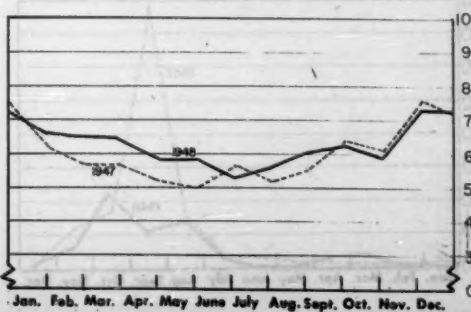
GULF - HOLDINGS OF FROZEN FISH



WASHINGTON, OREGON, AND ALASKA - HOLDINGS OF FROZEN FISH



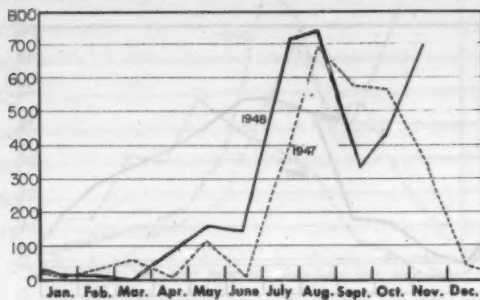
CALIFORNIA - HOLDINGS OF FROZEN FISH



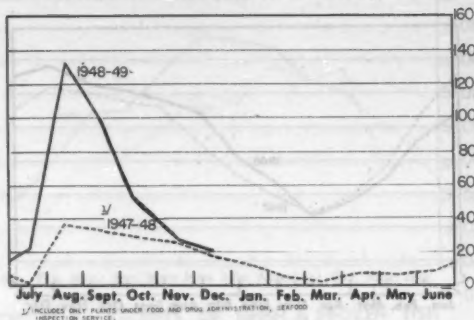
CANNED FISHERY PRODUCTS

In Thousands of Standard Cases

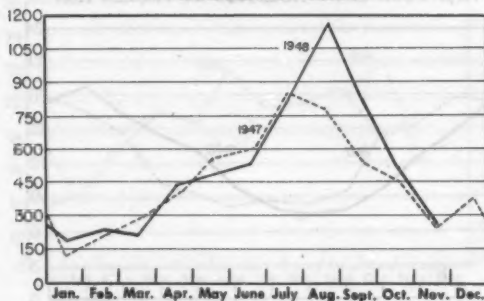
MAINE - SARDINES, ESTIMATED PACK *



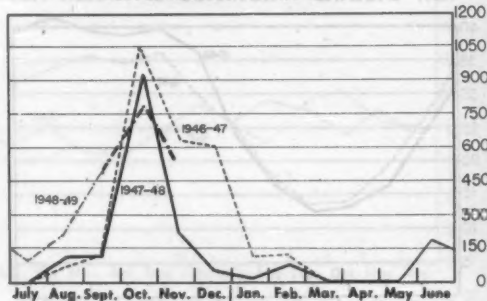
UNITED STATES - SHRIMP



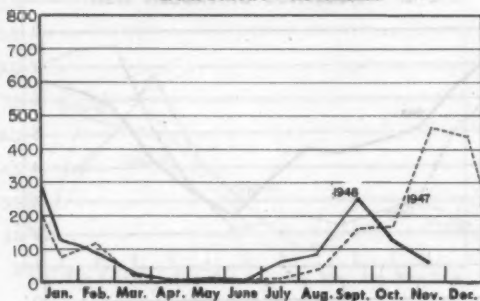
CALIFORNIA - TUNA



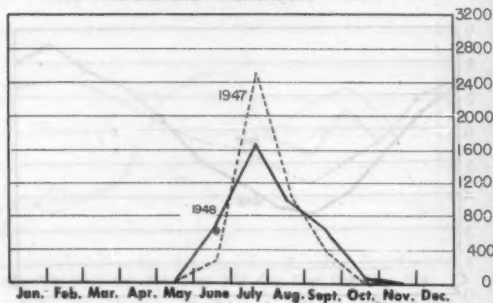
CALIFORNIA - PILCHARDS



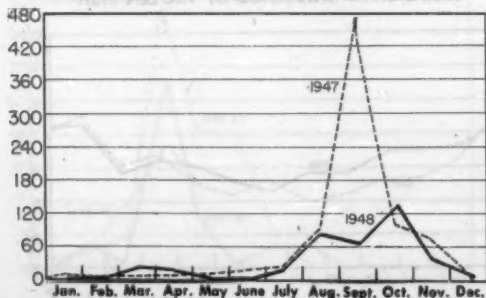
CALIFORNIA - MACKEREL



ALASKA - SALMON



WASHINGTON - PUGET SOUND SALMON *

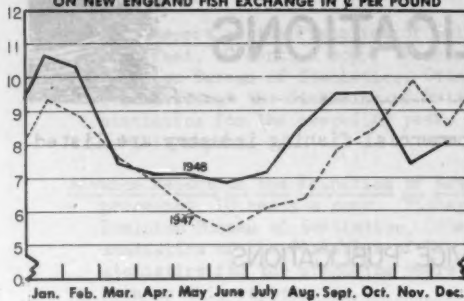


STANDARD CASES

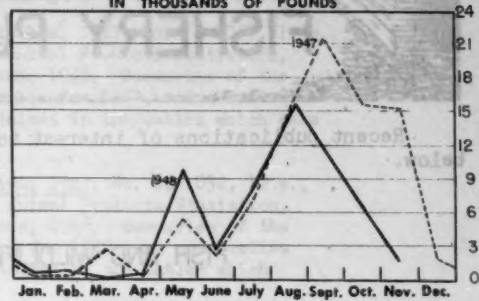
Variety	No. Cans	Can Designation	Nat. Wgt.
SARDINES	100	1/4 drawn	3 1/4 oz.
SHRIMP	48	No. 1 picnic	7 oz.
TUNA	48	No. 1/2 tuna	7 oz.
PILCHARDS	48	No. 1 oval	15 oz.
MACKEREL	48	No. 300	15 oz.
SALMON	48	1-pound tail	16 oz.

PRICES, IMPORTS and BY-PRODUCTS

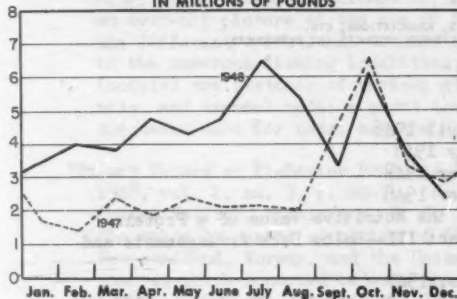
BOSTON - WEIGHTED AVERAGE PRICE
ON NEW ENGLAND FISH EXCHANGE IN ¢ PER POUND



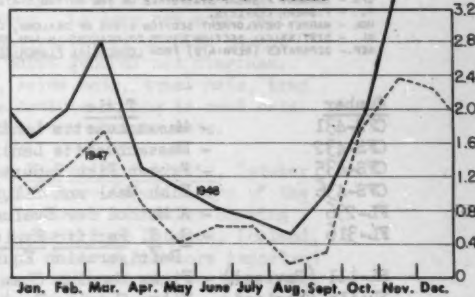
MAINE - IMPORTS OF SEA HERRING
IN THOUSANDS OF POUNDS



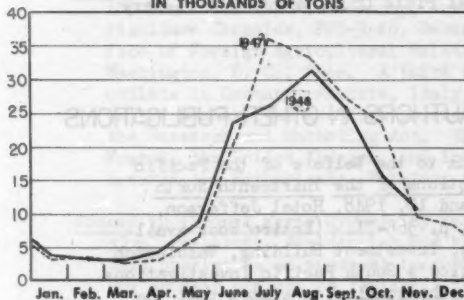
U.S. - IMPORTS OF FRESH & FROZEN FILLETS
OF GROUND FISH, INCLUDING ROSEFISH-
IN MILLIONS OF POUNDS



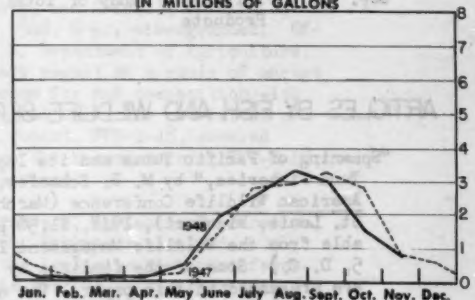
U.S. - IMPORTS OF SHRIMP FROM MEXICO
IN MILLIONS OF POUNDS



U.S. & ALASKA - PRODUCTION OF FISH MEAL
IN THOUSANDS OF TONS



U.S. & ALASKA - PRODUCTION OF FISH OIL
IN MILLIONS OF GALLONS





RECENT FISHERY PUBLICATIONS

Recent publications of interest to the commercial fishing industry are listed below.

FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PUBLICATIONS ARE AVAILABLE FREE FROM THE DIVISION OF INFORMATION, FISH AND WILDLIFE SERVICE, DEPARTMENT OF THE INTERIOR, WASHINGTON 25, D. C. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

- EFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES AND ALASKA.
- FL - FISHERY LEAFLETS.
- NOL - MARKET DEVELOPMENT SECTION LISTS OF DEALERS, LOCKER PLANTS, ASSOCIATIONS, ETC.
- SL - STATISTICAL SECTION LISTS OF DEALERS IN AND PRODUCERS OF FISHERY PRODUCTS AND BYPRODUCTS.
- SEP. - SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

Number	Title
CFS-431	- Massachusetts Landings, April 1948
CFS-432	- Massachusetts Landings, May 1948
CFS-435	- Frozen Fish Report, November 1948
CFS-436	- Fish Meal and Oil, September 1948
FL-296	- A Method for Evaluation of the Nutritive Value of a Protein
FL-316	- S. S. Pacific Explorer - Part III--Below Deck Arrangements and Refrigeration Equipment
SL-111 (Revised)	- Firms Canning Clam Products, 1947
SL-116 (Revised)	- Firms Canning Food for Animals, from Fishery Products, 1947
Sep. 220	- United States Per Capita Consumption of Fishery Products
Sep. 221	- Preliminary Study of Total Bacterial Plate Count Method for Fishery Products

ARTICLES BY FISH AND WILDLIFE SERVICE AUTHORS IN OTHER PUBLICATIONS

"Spawning of Pacific Tunas and its Implications to the Welfare of the Pacific Tuna Fisheries," by M. B. Schaefer, Transactions of the Thirteenth North American Wildlife Conference (March 8, 9, and 10, 1948, Hotel Jefferson, St. Louis, Missouri), 1948, \$1.50 per copy, p. 365-71. (Entire book available from the Wildlife Management Institute, Investment Building, Washington 5, D. C.) Some of the findings by the Service's South Pacific Investigations are presented in this paper. The author in the conclusion states that the practical management of the tuna fishery depends in the very first instance on determining the geographical limits of the stocks involved. The application to Pacific tunas is formidable only in magnitude, not in method, and the problems presented by the tuna populations inhabiting the Pacific cannot be side-stepped if the commercial tuna fishery is to attain its maximum development on a sustained yield basis. The rational development of the industry, and the regulation of the high seas fishery both have as objectives the optimum, or sustained yield from the resource. In order to approach this optimum, or even in order to know how it may be approached, there must be obtained basic data on the biology and ecology of the tuna populations.

MISCELLANEOUS PUBLICATIONS

THE FOLLOWING PUBLICATIONS MAY BE OBTAINED, IN MOST INSTANCES, FROM THE AGENCIES ISSUING THEM.

Advance Report on the Fisheries of British Columbia, 1947, No. 12-1029, 12 p., processed, 10 cents a copy. Fisheries and Animal Products Statistics, Dominion Bureau of Statistics, Ottawa, Canada, 1948. Summaries of the statistics of the fisheries of British Columbia for 1947, and comparative statistics for the preceding years are contained in the tables which make up this report.

Advance Report on the Fisheries of New Brunswick, 1947, No. 12-1032, 12 p., processed, 10 cents a copy. Fisheries and Animal Products Statistics, Dominion Bureau of Statistics, Ottawa, Canada, 1948. Summaries of the statistics of the fisheries of New Brunswick for 1947, and comparative statistics for the preceding years are contained in the tables which make up this report.

Commercial Fishermen's Reference Book, Second Edition, 52 p. illus., printed. R. J. Ederer Company, Chicago 10, Ill., \$2.50 per copy. This book gives an over-all picture of the use of fish netting. It does not cover all the different operational methods nor all the varieties of fish caught in the numerous fishing localities, but it shows general net diagrams. Included are sketches of various gill nets, seine nets, trawl nets, trap nets, and trammel nets; a short descriptive article on how to mend nets; the twine used for nets; and the knots used by men who use nets.

"Export Values of Fisheries Products," article, Fisheries Bulletin, October 1948, vol. 1, no. 3, p. 64-71. Food and Agriculture Organization of the United Nations, Washington, D. C. Presents a series of tables showing the value by market countries of fisheries exports from Denmark, Iceland, Newfoundland, Norway, and the United Kingdom. Some of the more important changes which occurred between the prewar year 1938 and the postwar years 1946 and 1947 are noted in the text preceding the tables.

Foreign Market Notes--Fish and Fish Products (Arthur M. Sandberg Reports on the Fish Situation in Germany, Austria, Italy, and Greece), Foreign Agriculture Circular, FFP-3-48, December 10, 1948, 6 p., mimeographed. Office of Foreign Agricultural Relations, U. S. Department of Agriculture, Washington, D. C., free. A third preliminary report of a study of market outlets in Germany, Austria, Italy, and Greece for and competition with United States fish and fish products, conducted under the provisions of the Research and Marketing Act. The first report, FFP-1-48, covered France, the United Kingdom, and Ireland; and the second report, FFP-2-48, covered the Netherlands, Belgium, and Switzerland.

Hemmed In (Fröngt Fyrir Dyrum), by Matth. Thordarson, Icelandic Publication, 32 p., printed. Adalutsalan Hjá h/f Leiftur, Reykjavik, Iceland, 1946. This booklet is an argument in support of the Icelandic viewpoint favoring greater control on Iceland's part of the fishing banks lying near its shores. In spite of the belief expressed by the author that an extension of the limits of Iceland's territorial waters to four miles would be "the most desirable solution," as a compromise he suggests that the three-mile limit be retained but that Iceland assume jurisdiction over the waters of all bays and fjords with entrances of twenty miles or less in width instead of the present ten miles. (Iceland passed a bill in 1948 specifying that it will maintain control over all fisheries within the boundaries of the coastal shelf.) Since the edges of the coastal shelf are clearly marked on the chart contained in this booklet, it is apparent that the mode of measurement defined in the bill would give Iceland jurisdiction over a marginal belt which in many places would be more than fifty miles wide. Numerous geographical, historical, and economic reasons why foreign vessels should be kept at a greater distance from Iceland's coast than is now the case are given by the author.

A Symposium of Fish Populations, composite authorship, vol. XI, art. 4, 283 p. with tables and graphs, \$4.25 per copy. Bulletin of The Bingham Oceanographic Collection, Peabody Museum of Natural History, Yale University, New Haven, Conn., May 1948. This is a report on the symposium held at The Royal Ontario Museum of Zoology, Toronto, Canada, January 10 and 11, 1947. The following papers were presented:

1. "Fishing and Assessing Populations," by A. G. Huntsman, p. 5-21. States that facile apparent solutions of fishery problems, due to their complexity, have not proved to be effective. Increased fishing intensity will have different effects upon populations of at least one kind of fish (such as *Hippoglossoides*), depending upon whether or not the fish have a short life and rapid growth, growth over many years to a great size, or are stunted from very slow growth. Greatly increased fishing intensity on Passamaquoddy herring, finally involving all ages starting with yearlings, resulted in the take being doubled, with no failure in maintenance but with marked decrease in the large fish. Regulations to permit small fish to become large for a greater take seem to have no basis in fact, to judge from mortality of salmon freed as grilse. Restriction in fishing to give more spawning seems unwise until there is clear evidence that more spawning is required. According to the author, various fishery conditions have been confused under the terms "overfishing" and "depletion." Assessment of the populations is possible only through capture of the fish, and can be accurate only by proper interpretation of the given capture.

2. "North American Attempts at Fish Management," by T. H. Langlois, p. 33-54. Following a brief statement of the history and growth of the North American fisheries, the paper contains a discussion of the present biological concept of the effects of fishing on fish stocks and the actual inapplicability of this concept to the major fisheries. The new movement, particularly on the part of fishery biologists in the mid-western and eastern states and Canada, exclusive of the U. S. Fish and Wildlife Service, attributes major fluctuations of fish abundance to effects of an environment which fluctuates in its suitability for larval fish rather than to depletion by overfishing. The author offers the suggestion that other bodies of water may have "key areas" like that described for Lake Erie, wherein the cycle leading to fish production is either started or kept from starting. Recent efforts of trying to improve fishing in mid-western inland waters are reviewed.

3. "European Studies of the Populations of Marine Fishes," by J. R. Dymond, p. 55-80. This paper covers the study of the fish populations of European waters developed chiefly in the Scandinavian countries and in Great Britain largely as a result of the economic importance of the fisheries of these countries. Outstanding discoveries include the facts that some year-classes are fifty or sixty times as abundant as others, that such wide fluctuations characterize most of the important commercial species, that even when fish are abundant there are wide fluctuations in availability due to hydrographic conditions, and that great fluctuations in abundance also characterize the fauna of the sea bottom. Demonstration of considerably increased mortality due to fishing has led to action designed to prevent overfishing. The International Council for the Exploration of the Sea has contributed materially towards the study of these problems and in initiating international action to meet situations uncovered. The discovery that the age of fish and certain characteristics of their life histories could be read from the scales has been basic to many phases of population work. The organization of statistics, especially those on an international scale, has also been an indispensable tool in population studies. The understanding of populations and of the factors affecting them has reached the stage where in some species fishing probabilities have been attempted with considerable success, according to the authors.

4. "Fluctuation in Abundance of Pacific Halibut," by M. B. Burkenroad, p. 81-129. This paper, an analysis of data published by the International Fisheries Commission, indicates that the decline in abundance of halibut on the Pacific Coast west of Cape Spencer between 1915 and 1930, and the increase since that date may both have been much greater than can be accounted for by the changes in amount of fishing. According to the author, it, therefore, seems possible that the major fluctuations in abundance of this stock of fish should be attributed to natural causes, perhaps of a regularly cyclical sort. In view of these results, it is suggested that the desirability of applying current theories of biological management to marine fisheries remains to be demonstrated.

5. "Studies on the Marine Resources of Southern New England (VII. Analysis of a Fish Population)," by Daniel Merriman and H. E. Warfel, p. 131-164. This is a study of the species taken in the winter flounder trawl fishery off Rhode Island and Connecticut and is based on monthly representative samples of the catch from August 1943 to July 1946. It is an analysis of the population as a whole, with particular reference to its seasonal and annual organization and the relationships of its components. The history of the fishery and its present status are outlined. Of the total catch by weight during the three-year period, it is estimated that 55 percent was actually marketed and 45 percent discarded as trash. The adequacy of this method of sampling the population, the relative and seasonal abundance of the different species, and the evidence for inter-specific relationships (particularly between the two dominant elements of the catch, winter flounder and skate) are discussed in some detail. The study provides a framework upon which more precise information can be constructed, as well as a basis for future comparison, and so affords an approach to the question of overfishing and related problems.

6. "Estimating Fishing Intensities," by A. W. H. Needler, p. 165-171. The paper deals with two principal points: (1) the distinction between availability as indicated by catch-per-unit-of-effort and population as indicated by fishing mortality and catch, and (2) the decline, as fishing intensity increases, in the value of availability as an indication of changes in abundance and the corresponding increase in the importance of knowing fishing mortalities and populations. The latter are essential to any clear understanding of intensive fisheries and whether or how to manage them.

7. "Computation of Fish Production," by W. E. Ricker and R. E. Foerster, p. 173-211. This paper defines the annual production of a fish population as the product of the average population on hand and the instantaneous rate of growth, summed over the whole of the year. A computation of production has been made for the young sockeye salmon of Cultus Lake, British Columbia, where it proved satisfactory to divide the year into half-month periods for this purpose. According to the author, production is concentrated in the summer months and falls to zero in winter. The fraction of the total production which appears as "yield" (seaward migrants) has varied. The mortality rate is greatest while the sockeye are very small, and the prolongation of this period of small size (hence greater vulnerability) in years when many fry are present appears to be a part of the mechanism whereby the total size of the population is regulated. Insofar as mortality is the result of predation, the instantaneous mortality rate is a direct measure of the activity of the predators, and rather small changes in amount of predation suffice to produce large changes in the percentage of the fish which survive, when that percentage is not large. No evidence is available that other causes of death are of any great importance to young sockeye, though that possibility cannot be wholly excluded. Computations of the production of other species of fish in other bodies of water will usually be more difficult than for the Cultus sockeye, but very likely it will often be possible to obtain data from which they can be estimated with sufficient accuracy to be of real usefulness.

8. "Prospects for Managing our Fisheries," by R. E. Foerster, p. 213-227. The author states in this paper that fisheries management is practicable only where adequate information is available. Prediction of sizes of populations, based on knowledge of existing stocks and effect of new-age classes, is suggested as a valuable feature of management. Many basic factors still have to be studied; e. g., relationship of spawning to recruitment, factors limiting early survival, mortality rates in the ocean, adequate statistics, inter-specific relationships, variation in oceanographic conditions. Setting up of quotas may be a useful means of regulation provided that these are allowed flexibility to be altered as new data indicate. Limitation of fishermen may be required, the author continues. Fisheries management policies to provide maximum sustained yield are the objectives of all fisheries. Progress is being made but the rate is dependent on the extent to which pertinent data can be accumulated. In conclusion, the author states that it seems highly desirable that some measure of fisheries management should be developed to maintain a high sustained yield for our commercially-important fisheries.

9. "Limiting Factors of Fish Populations (Some Theories and an Example)," by W. C. Herrington, p. 229-283. The purpose of this paper, which draws extensively upon results of the work carried on by the Haddock Investigations of the Fish and Wildlife Service under the direction of the author, is to determine the factors having most influence on the average productivity of certain fish populations; to develop the theoretical relationships expressing the effect of these factors on fish stocks; to test the validity of the theoretical relationships by using actual data for certain fisheries; and to apply the conclusions to the problems of explaining the present poor condition of the haddock population and how it can be improved. The theoretical relationships developed indicate, under the conditions considered, that average relative recruitment to the usable stock of fish is dependent chiefly upon the size of the spawning stock and of the competitive stock. The conclusion that recent supplies of food available to haddock have been reduced materially is supported by independent evidence from studies of adult stock distribution on the fishing grounds and from growth rates. Increases in the population of other species have not been sufficient to explain the decrease in haddock food. This study shows that the recent scarcity of haddock resulted from reduced food supplies for haddock and from underfishing during the war. It also indicates that recruitment should increase during 1947-48, and that to maintain a high yield in the future, the adult population must be held within the limits required for good spawning and minimum intraspecific competition.

A History of Fishes, by J. R. Norman, 463 p. with plates and figures, printed. A. A. Wyn, Inc., New York, N. Y., \$6.50. A comprehensive indexed reference book of facts, life history, evolution, distribution, and environment of the fishes of the world. Includes chapters on the fisheries of the world, fishing methods, and fishery research which give the relationship of fishes to the life of mankind. However, most of the book covers the definition of fishes and their position in the animal kingdom, their shapes, fins, skin, scales, spines, teeth, internal organs, senses and sense organs, coloration, food, distribution and migrations, breeding, development, classification, fish as food for man, and myths and legends concerning fish. First published in 1931, this new edition differs from the original only in the addition of a foreword.

"Problems Connected with the Management of the Sardine Fishery," by F. N. Clark, article, Transactions of the Thirteenth North American Wildlife Conference (March 8, 9, and 10, 1948, Hotel Jefferson, St. Louis, Missouri), 1948, \$1.50 per copy, p. 339-347. Entire book available from the Wildlife Management Institute, Investment Building, Washington 5, D. C. This paper summarizes the history of the West Coast sardine industry, and the available information on the biology of the sardine. According to the author, plans for the management of the West Coast sardine fishery must be based on the information at hand which indicates a population at a low level of abundance subjected to heavy fishing intensity, an inadequate catch of sardines, and heavy financial loss to the industry.

Seventh Annual Report of the Atlantic States Marine Fisheries Commission, (To the Congress of the United States and the Governors and Legislators of the Fourteen Compacting States), 48 p., printed. Atlantic States Marine Fisheries Commission, New York, N. Y., December 1, 1948. In this report, the Commission discusses many fisheries matters, some originated by the Commission, others originated by Federal, State, interstate, and other agencies, during 1948. Reports on meetings of the various sections and committees of the Commission; a brief summary of the discussions regarding lobster, clam, shrimp, haddock, shad, and crab problems; and a table of legislative action needed in each of the fourteen member states to put into effect the various recommendations duly made by the Commission or one of its sections or committees are included.

"Surveys of World Fisheries," article, *Fisheries Bulletin*, 25 cents a copy, November 1948, vol. 1, no. 4, p. 86-91. Food and Agriculture Organization of the United Nations, Washington, D. C. This article covers the Aden Colony and Protectorate, Eritrea, British Somaliland Protectorate, Zanzibar Protectorate, Tanganyika, and Uganda.

Unda Maris 1947-48, Nordisk Fiskebatbyggarekongress 1947 (Northern Fishing Vessel Building Congress 1947), Swedish publication, 298 p., illus., printed. Jan-Olof Traung, Gothenburg, Sweden. A report of the Northern Fishing Vessel Building Congress held at Gothenburg, Sweden, June 1-4, 1947. The following are titles of some of the leading chapters: "Shipbuilding Progress in Iceland," "Construction of Modern Fishing Boats in Norway," "Stability Problem of Fishing Vessels," "Propeller Problem of Fishing Boats," "The Hydraulic Winch," "Use of Light Metal in Fishing Vessels (Aluminum-Magnesium Alloy)," and "Standardized Building and Construction Techniques for 300-ton Wooden Schooner."

Yearbook of Fisheries Statistics--1947, 368 p. with 229 tables, processed. Food and Agriculture Organization of the United Nations, Washington, D. C., 1948, \$4.00. Experts look upon three-fourths of the earth's surface which is ocean, lakes, rivers, ponds, reservoirs, and streams as potentially a fruitful source of increased world food supply for the world's growing population. As a forward step in the exploration of this possibility, FAO has just published a comprehensive statistical review of world fisheries. This book gives details of the fisheries of 61 countries. It is the first in a series which, FAO hopes, will eventually record every important fact and development connected with world fishing. Quantities are stated in metric tons or metric quintals; values in monetary unit of each country. The tables, which make up the major part of the book, give details concerning many important aspects of the fishing industry, including imports, exports, landings, craft, gear, labor, fishery products, aquiculture, whaling, and processing. The preface is printed in English, French and Spanish. It contains also a tabular index in English and French. FAO sales agents throughout the world now have the book in stock. In the U. S., it may be purchased from the FAO Documents Sales Service, Food and Agriculture Organization, 1201 Connecticut Avenue, N. W., Washington 6, D. C.



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Illustrator -- Gustaf T. Sundstrom

Compositors -- Jean Zalevsky and Norma D. Loeffel

PACKAGING FROZEN FISHERY PRODUCTS

"Packaging Frozen Fishery Products," Fishery Leaflet 324, covers the problems of freezing and frozen storage of fish and shellfish, the packaging requirements, and changes in flavor which occur during periods of frozen storage.



This 10-page illustrated leaflet contains two tables which show the total loss in weight of packaged oysters and fillets at 0° F. for different types of packaging.

According to the author, the quality of frozen fish and shellfish is determined, to a large degree, by the quality of the product at the time of freezing and the manner in which it is stored. The function of the package is to help maintain that quality from the time the product is prepared for freezing until it is opened by the consumer.

Fishery Leaflet 324 may be obtained upon request, without charge, from the U. S. Fish and Wildlife Service, Washington 25, D. C.

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